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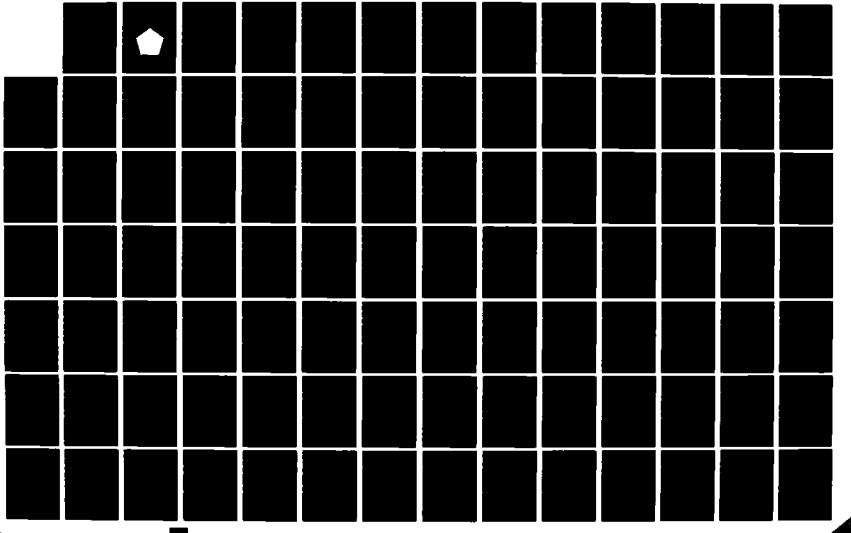
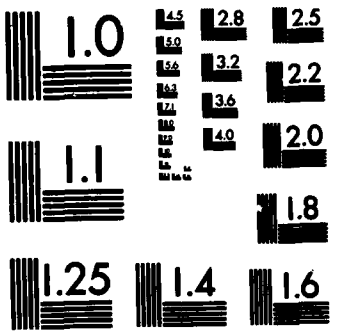
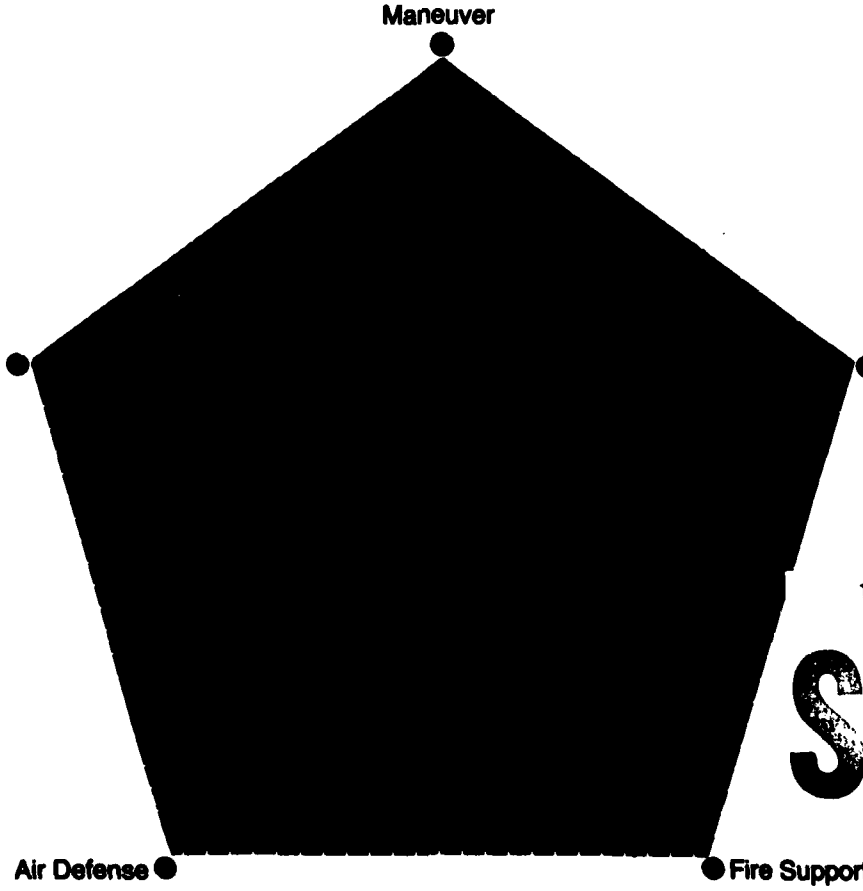




Functional Area Representation Objectives (FAROs) for the Corps/Division Evaluation Model (CORDIVEM)



MITRE

MTR-82W00175

Functional Area Representation Objectives (FAROs) for the Corps/Division Evaluation Model (CORDIVEM)

The MITRE Corporation

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Functional Area Representation Objectives (FAROs) for the Corps/Division Evaluation Model (CORDIVEM)

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October 1982

MTR-82W00175

SPONSOR:
Army Model Improvement Management Office
CONTRACT NO.:
F19628-83-C-0001

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MITRE Department
and Project Approval: B Friedlander

ABSTRACT

This document presents Functional Area Representation Objectives (FAROs) for Army maneuver control, intelligence and electronic warfare, fire support, air defense, combat service support, and force command and control. These FAROs were developed in support of the Army Model Improvement Program (AMIP), specifically to serve as a basis for developing the design objectives for a Corps/Division Evaluation Model (CORDIVEM).

Besides the detailed FAROs, this report includes the methodology used in deriving the representations, the definitions of the functional areas, and a quick reference outline of each functional area.

ACKNOWLEDGEMENT

The authors wish to acknowledge and to thank the personnel of the AMMO office, especially Major John A. Strand III, for their extensive suggestions and comments during the preparation of this document.

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1.0 INTRODUCTION

1.1 Purpose and Scope

In February 1982 the Army tasked The MITRE Corporation to assist the Army Model Improvement Program (AMIP) Management Office (AMMO) in the development of design objectives for its corps/division level model and in assessing candidate model architectures for that model. This paper discusses the background of the AMIP as well as the methodology and development of the design objectives and their application, and presents detailed functional area representation objectives used in the development of the design objectives. A technical assessment of the candidate corps/division level models is presented in a separate paper.[28]

1.2 AMIP Background

In 1978 the Army conducted a review of its analysis resources, organizations and procedures for the purpose of making specific recommendations for improvements. One of the recommendations made by the study and subsequently approved by the Army was that the development and implementation of a family of structured combat and support models be undertaken. This evolved into what is now called the Army Model Improvement Program (AMIP).[22]

The AMIP Management Office (AMMO) was created in April 1980 with the primary mission of centrally managing the development of a hierarchical set of Army models. The executive agency responsible for direction, coordination and completion of AMIP efforts is the Training and Doctrine Command (TRADOC). Overall guidance for the program at Department of the Army level is provided by the Army Models Committee.[2]

The AMIP hierarchical concept has three combat models and supporting data bases as its principal components (Figure 1). The battalion-level model is the Combined Arms and Support Task Force Model (CASTFOREM) being developed by the TRADOC Systems Analysis Activity (TRASANA). The corps/division level model is the Corps/Division Evaluation Model (CORDIVEM) in development at the Combined Arms Studies and Analysis Activity (CASAA). The force-level (above corps) model is the Force Evaluation Model (FORCEM) in development at the Concepts Analysis Agency (CAA). The AMMO also has overall managerial responsibility for the development of the supporting data bases. Each of the models simulates the various aspects of combined arms operations, combat support and combat service

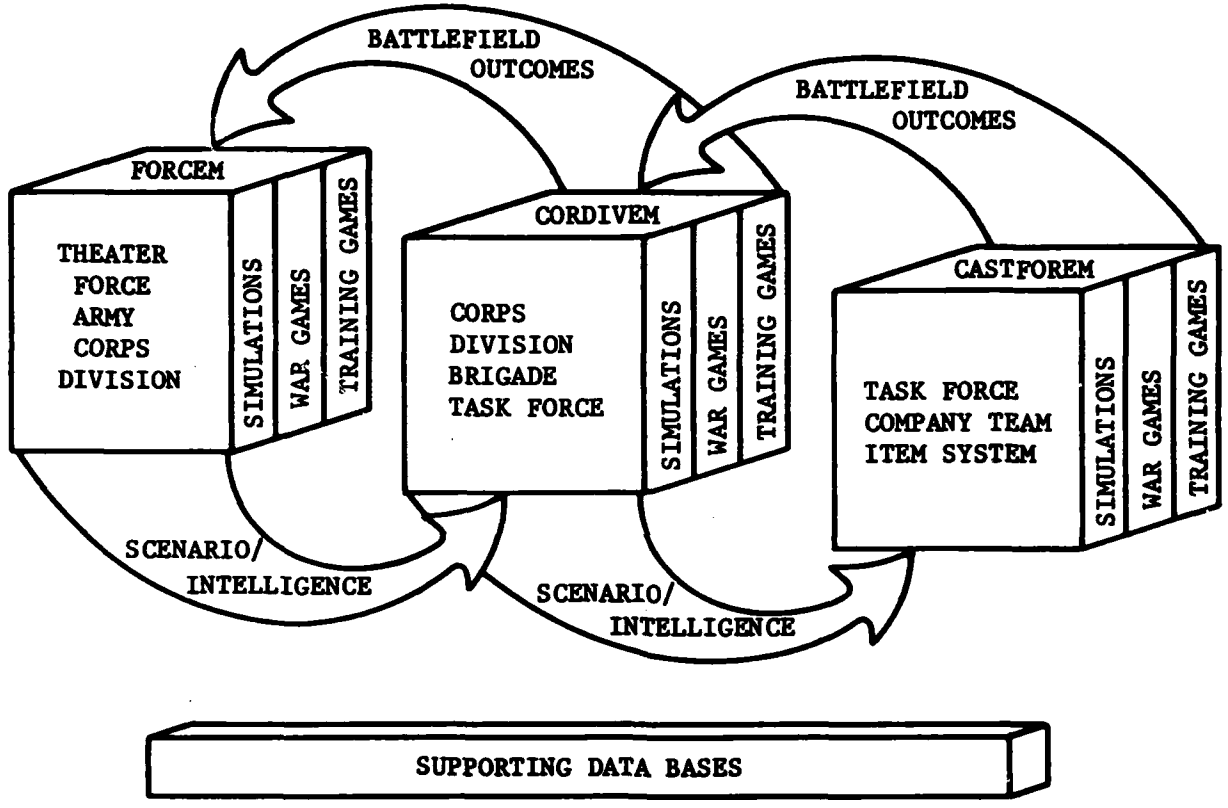

FIGURE 1
THE AMIP CONCEPT

support. It is envisioned that there will be three principal versions of each of the models: a fully-automated combat simulation, an interactive wargame, and a training version. A fourth version will be a quick-running, less-detailed version of the simulation used for screening and linking the levels of the hierarchy. Linking the models will provide the combat results of the lower-level models to the higher models, and will provide the scenario and intelligence data from the higher-level models to run the lower-level models.

The model improvement program is to have operational automated versions of each model in the hierarchy by the end of 1983.

1.3 Report Overview

The remainder of this paper discusses the development and use of the functional area representation objectives used in the development of the design objectives for the Corps/Division Evaluation Model. Section 2 presents our methodology used in deriving the representation objectives. Section 3 presents a description of the functional areas and the integrating function of force control. Section 4 discusses the uses that have been made of the representation objectives and where they can be applied in the future. The detailed representation objectives are presented as appendices, together with notional organizational charts and a separate quick-reference outline.

2.0 METHODOLOGY

2.1 Model Design Development

The AMMO approach to model development, as depicted in Figure 2, incorporates the matching of user requirements with descriptors of the various combat functional areas to be modeled. User requirements were drawn up by a special task force who queried major study users for current and future study areas and questions. These user requirements were staffed through the major Army commands and revised accordingly. Functional area descriptors were drawn up in representation objectives and define the manner and level of representation required for portrayal of the battlefield combat dynamics. The developing list of user requirements was a basis of consideration for the specific and total amount of representation recommended.

The user requirements and functional area representation objectives were matched to derive model design objectives for functional representation within the models. Other design objectives addressed model performance parameters such as memory usage and set-up requirements. In the derivation of the design objectives, consideration was given to the state of the art in computer hardware and software for modeling so that realizable objectives could be attained.

2.2 Orientation

Several findings from the review of Army analysis indicated the need for better representation of combat processes and functional areas within the simulation models. The modeling of command and control, particularly at division and higher levels, has not been well done in the past. Non-attrition processes of combat and combat service support have not been included in models to the same level of detail as the attrition processes. There is also a need for a better capability to model nuclear, chemical and directed energy weapons, air defense and contingency forces. It was in these areas that the model development would focus.

As the middle-level model in the AMIP hierarchy, CORDIVEM will be used to address questions of force structure trade-offs and the analysis of tactics and doctrine. The model must also be capable of providing insight into the effects of various system enhancements on the effectiveness of the combat force.

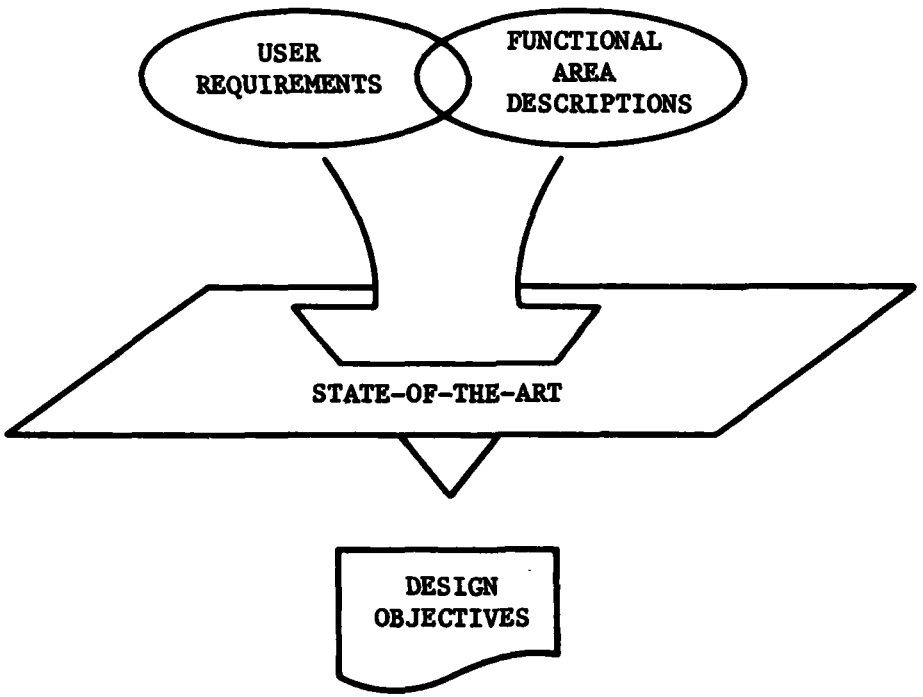

FIGURE 2
DESIGN OBJECTIVES CONCEPT

2.3 Source References

As part of its support for the U.S. Army Communications-Electronics Command, MITRE conducted detailed functional area analyses for maneuver control, fire support, air defense and intelligence/electronic warfare. The second phase of this effort involves the development of functional system specifications for the command and control related to these functional areas. It was possible to take advantage of this previous work as a starting point in the development of the representation objectives for the functional areas.

Army field manuals were also used as source references, as well as comments, corrections and suggestions from interested agencies, schools and centers (see references).

2.4 Functional Area Representation Objectives

A Functional Area Representation Objective (FARO) describes in detail the major processes or functions which occur in a functional area, the factors which affect the performance of these processes, and the command and control structures which cause the processes to occur or fail to occur. The representations include descriptions of the functional area capabilities, effects of and on those capabilities, and the command and control (C^2) units and action units. Hierarchy/information flow charts are used to portray the relationships among the action and control units and the force control. Appendix I contains a detailed outline of the structure used in the FAROs.

2.4.1 Functional Area Capabilities

In deciding which set of capabilities in a functional area constituted the essence of the function, two questions were asked:

- Does the process or capability have a consistent, continuing impact on the overall combat outcome experienced at the corps/division level?
- Is the process or capability essential to addressing user issues relating to the functional area under consideration?

If the answers to the two questions were in the affirmative, the capability was included in the representation. See section 3 for candidate capabilities which were not included.

2.4.2 Effects

The second section of a FARO discusses effects in the following five categories:

- Effects of executing the capabilities on targets, the environment and on the unit's assets
- Effects of combat on unit capabilities
- Effects of the environment on unit capabilities
- Effects of situational factors upon the capabilities
- Effects from other functional areas

2.4.3 Control and Action Units

The capabilities and processes of each functional area are carried out by units of two types -- control and action. Control units exercise the command and control capabilities necessary to enable the action units to execute the process or apply the capability. The representation of the units includes the units' assets and capabilities as well as the information flows between the two unit types.

2.4.4 Reference Timelines

The tactics, doctrine, and organizations of the FAROs reflect a 1980 baseline. However, wherever possible, the FAROs were described generically so as to encompass force structure alternatives and the analysis of new tactics and doctrine (e.g., Air-Land 2000).

3.0 FUNCTIONAL REPRESENTATION DESCRIPTION

3.1 Functional Areas

The following sub-paragraphs give a general description of the functional areas of maneuver control, I/EW, fire support, air defense, and combat service support as represented in Appendices III - VIII. A condensed overview of the representation descriptions is provided in Appendix II.

3.1.1 Maneuver Control

The Maneuver Control (MC) functional area is composed of two subfunctional areas: combat, which includes the actual fighting forces controlled at the corps, division and brigade echelons; and combat support, which is composed of those units which either provide mobility support to friendly combat units, or construct countermobility obstacles to enemy movement.

3.1.1.1 Combat. The essence of combat is the rapid movement of air and ground forces to gain an element of surprise and spatial advantage over enemy forces and to capitalize on enemy relative weaknesses to defeat him through the use of firepower. The capabilities included in the FARO are:

- Battle planning/situation assessment
- Battle direction/situation assessment
- Reconstitution coordination/planning
- Reconnaissance/surveillance direction
- Communication
- Movement
- Shooting

The first six capabilities above are those which pertain to combat control units, and the last three pertain to combat action units. The overlap is intentional -- control units and action units alike must communicate and move.

3.1.1.2 Combat Support. The essence of the combat support segment of maneuver control is to facilitate friendly force movement and to simultaneously obstruct enemy movement in concert with the ground commander's overall scheme of maneuver.

The maneuver commander's ability to communicate is discussed in the sections that deal with communications assets of the control units and action units and their asset status.*

Engineer topographic and photographic capabilities, as well as military police (MP) forces are not included in this paper since they do not significantly contribute to the essence of combat support for a corps/division model. All engineer units can, when required, fight as infantry, although there is a time delay involved in making the transition.

The capabilities represented for combat support control and action units include:

- Combat support planning and direction
- Airmobility support involving army helicopter lifts of ground forces
- Engineer mobility/countermobility support, which includes bridging and bridge demolition, minefield and other obstacle breaching and emplacement
- Engineer general support, including road and bridge repair and improvement (widening minefield lanes, airfield construction and repair, command post construction support), usually performed in the rear areas
- Engineer survivability support, including decontamination and water supply and defensive position construction
- Movement, i.e., the re-positioning of the combat support elements. (Because it is a secondary function, movement is not explicitly detailed in the functional representation section, although it is considered in the effects section.)
- Communications

---

*Emplacement times, down times, repair times, etc., for signal facilities can be obtained from signal-oriented simulations and depicted in a corps/division model as changes in the status of combat control unit communications assets.

3.1.2 Intelligence/Electronic Warfare (I/EW)

The I/EW functional area is composed of two segments: a) intelligence collection, processing and dissemination; and b) offensive electronic warfare. While these could be considered as two separate subfunctional areas of I/EW, their interdependency is so great that for the purposes of a corps and division level model they have been described together.

The intelligence activity (I) consists of collection, single-source analysis, multi-source analysis (fusion) and reporting. Collection refers to the role of sensors, i.e., electronic listening devices, radars, cameras, reconnaissance patrols, weather balloons, or interrogation teams. Sensors are of little use without the means to process and report their findings in an accurate and timely manner. Single source analysis involves the data verification and correlation of a single type of sensor report, e.g., electronic intelligence. Multi-source analysis is the synthesis of many types of sensor reports along with terrain, weather, and the scheme of maneuver to produce an interpretation of the enemy force location, strength, movement, and intent. Finally, dissemination of the results of this analysis ensures that the force commander and functional area C^2 elements obtain up-to-date information on the enemy so that the combat effort can be directed in the most advantageous manner.

Electronic warfare (EW) relies on the use of both electronic receivers and jamming transmitters to collect information about the enemy's use of the frequency spectrum, and to capitalize on that information by disrupting enemy communications and radar operations.

There is an overlap between the two areas of intelligence and electronic warfare with respect to the use of the signals intelligence (SIGINT). SIGINT collected to support jamming operations is also used in single and multi-source analysis. SIGINT sensor reports may thus be used both to support jamming requirements as well as input to the intelligence development process.

Several of the I/EW functions are not included in this representation for a corps/division level model (see para 2.4.1):

- Weather and terrain data collection
- POW/document capture and exploitation
- Cover & operations
- OPSEC (operations security)
- Deception operations

In each of the above, the function is either not significant enough to the on-going I/EW effort at the corps and division level to warrant inclusion, or current doctrine has not adequately detailed organizational responsibilities to the point where a model representation could be prepared.

The specific capabilities performed by I/EW units are the following:

- Collection mission management
- Jamming mission management
- Fusion management
- Collection (of all types)
- Jamming
- Fusion
- Movement or flying

3.1.3 Fire Support

Fire Support to the maneuver forces encompasses the available assets and capabilities of field artillery, air forces and naval gunfire. Other assets (e.g., tanks, helicopters, air defense weapons and mortars) may also be employed in providing firepower against ground forces. In the division of assets among the functional areas, tanks, helicopters and mortars have been considered as maneuver weapon assets and air defense weapons have not been considered in a ground fire support role.

3.1.3.1 Field Artillery. The purpose of field artillery is to deliver fires. Movement of artillery units is done to facilitate the delivery of fire and for defensive reasons. Target acquisition (through ground and aerial observers, the target acquisition battery and organic targeting elements, as well as from non-organic sources) contributes to fire delivery. Target identification and selection are also necessary before engagement and are part of the fire support command and control process. These functions together with the necessary command and control and communications of orders and information are the essence of the field artillery subfunction.

The fire support FARO is designed to be representative of what should be portrayed in a corps/division level systemic simulation and as such does not cover all of the possible missions and taskings of field artillery units (see para 2.4.1). In particular, only the field artillery missions of direct and general support are explicitly shown. Those of reinforcing and general support/

reinforcing increase the different ways in which maneuver units can receive fire support and should also be represented, but for the purpose of modeling, the weapons of a reinforcing unit can be viewed as additional assets which can be called on by the control unit concerned (fire support element or tactical operations center). No explicit representation of either artillery meteorological or survey operations is included.

Field artillery units have the following major capabilities:

- Planning and situation assessment
- Communications
- Delivery of fires
- Movement
- Target acquisition

3.1.3.2 Air Power.[33] Air power, as a subfunctional area of fire support, also has the capability of delivery of fire on the enemy, with consequent target damage, effects upon the environment and use of assets. Two missions of tactical air support which provide fire power in support of ground forces are battlefield air interdiction (BAI) and close air support (CAS).

BAI missions are air operations to destroy, neutralize or delay the enemy's military potential before it can be brought to bear effectively against friendly forces. These missions are conducted against targets sufficiently distant from friendly forces so that detailed coordination with the ground forces is not required. BAI missions, once requested by the Army force commander fall entirely under Air Force control unless fire coordination is necessary. A variety of attack and support aircraft and control procedures may be required for a BAI package depending on the friendly and enemy situation and location of the target. Because of the complex planning and coordination required, BAI missions are not diverted to other missions but may be diverted to other planned BAI targets if sufficient time is allowed for replanning and restructuring of the BAI package. The importance of correct intelligence is also stressed in order to avoid losses and unsuccessful missions. The detailed planning, Air Force control and mission execution should not be explicitly modeled.

CAS missions are air action against hostile targets in close proximity to friendly forces which require detailed coordination with the fire support and maneuver forces. CAS can take the form of immediate or the more efficient

preplanned missions. These missions normally originate from the forces in contact. Planning for air strikes and sortie allocation is done between ground and air representatives in the FSE's supporting the maneuver force. The requirements for planning and the control units involved are the same for CAS missions as those discussed under field artillery in the assignment of targets to fire support means. The action units in both planned and immediate cases are the sorties tasked to do the mission.

Requests for immediate CAS are initiated at the maneuver company level, passed to the battalion; forwarded by the tactical air control party (TACP) at battalion to the air support operations center (ASOC) at corps; monitored by the TACP at brigade and division level; coordinated by the TACP and ASOC with the maneuver and fire support staffs at each level; and ordered flown by the ASOC unless disapproval is received from any echelon. The ASOC is therefore the principal control unit other than the FSE's. The operation of the TACP can be considered a process performed in the FSE in the normal handling of fire support requests.

3.1.3.3 Naval Gunfire. Naval gunfire is used when available as an additional source of fire support for both planned and immediate fires. Naval ships may be assigned either a general or direct support role. Requests and communication are from the Army requestor to the naval gun fire representative at the appropriate echelon to the supporting ship.

The fire support functional representation depicts direct support (DS) ships in support of battalion or brigade units and general support (GS) ships in reserve to meet the division commander's needs.

Targets for immediate engagement by naval gunfire are normally acquired by ground personnel (forward observer or fire support team), but adjustment of fires is done by a naval gunfire spotter team if available.

Planning for the use of naval gunfire in support of the maneuver forces is carried out by naval gunfire officers in coordination with the FSE at each level. The requirements for the command and control units are the same as those discussed in the section on field artillery referring to naval gunfire. The capabilities discussed are therefore communications and delivery of fires.

3.1.4 Air Defense

The overall purpose of air defense is to disrupt enemy air activity without disturbing that of the friendly forces. The Air Force and the Army share the responsibility for accomplishing this purpose.

The Army's role in air defense is two-fold: to defend maneuver forces against air attack, and to deny enemy use of airspace. To fulfill this role, corps and division air defense units receive orders and information on hostile aircraft from Air Force or higher Army echelons as well as from organic means, and then engage and destroy the aircraft using missiles or air defense guns.

There are three primary air defense units - the HIMAD (High-Medium Air Defense) battalion, the SHORAD (Short Range Air Defense) battalion, and the GOC (Group Operations Center) of the air defense group. Each of these units is briefly discussed below.

The HIMAD battalions are theater-level assets whose purpose is to control long range missiles (i.e. HAWK). This purpose is accomplished in part by the battalion's fire control computer (Missile Minder). The HIMAD battalion may be used in General Support (GS) of a maneuver corps, or may be in general support reinforcing (GSR) to a division.

SHORAD battalions are generally organic to maneuver divisions, although non-divisional SHORAD battalions do exist. They employ short-range missiles such as the Chaparral and Stinger. The battalion commander is the division air defense officer as well as the division commander's adviser on air defense. The Division Air Defense (DIVAD) Gun/Stinger battery is the principal short-range unit employed in the brigade area.

The GOC controls HIMAD units defending the corps and SHORAD units in general support of the corps, and interfaces with the Air Force, higher Army echelons and the Corps Tactical Operation Center (CTOC).

At each echelon, the highest level air defense artillery unit maintains a close relationship with the maneuver headquarters; the GOC with the Corps Tactical Operations Center, the GSR HAWK Battalion Operations Center (BOC) and Division SHORAD Battalion Tactical Operations Center (TOC) with the Division TOC, and the DIVAD Gun/Stinger battery with the Brigade Tactical Operations Center.

There are four capabilities of air defense units to be represented:

- Planning and situation assessment
- Communications
- Delivery of fires
- Movement

3.1.5 Combat Service Support

The underlying goal of all combat service support activities is to maintain and support the operation of weapon systems. This goal is accomplished by four broad activities - to arm, fuel, fix, and man the systems - with another important activity, transportation, being embodied in each.

These four activities are represented by seven capabilities of action units:

- Petroleum, Oil, Lubricants (POL) supply (fueling the systems)
- Ammunition supply (arming the systems)
- Maintenance (fixing the systems)
- Personnel replacement (manning the system)
- Medical care (manning the systems)
- Water supply (fixing the systems since water is used for maintenance and decontamination as well as for drinking)
- Resupply of major end items (Class VII) (arming the systems) and supply of engineer building materials (Class IV) (fixing the system)

In carrying out the capabilities, combat service support units provide ten classes of supply, of which III, IV, V, and VII are treated in the FARO:

Class I	-	Subsistence (food, health and welfare items)
Class II	-	Clothing, individual equipment, hand tools, housekeeping equipment
Class III	-	POL, liquid gases, antifreeze, and related products
Class IV	-	Construction materials
Class V	-	Ammunition of all types
Class VI	-	Personal demand items for sale

Class VII	-	Major end items (launchers, tanks, vehicles, etc.)
Class VIII	-	Medical materials, including medical repair parts
Class IX	-	Repair parts and components for maintenance of all equipment except medical
Class X	-	Materiel to support nonmilitary programs, e.g., agriculture and economic developments.

Two systems are used for supply distribution: unit and supply point. When unit distribution is used, supplies are brought to the using unit; when supply point distribution is used, the using unit travels to a supply point to pick up the supplies. Supplies should be provided as far forward as possible; therefore, unit distribution is used if the tactical situation permits it. Otherwise, supply point distribution is used.

Combat service support functions are the responsibility of two major commands, Corps Support Command (COSCOM) and Division Support Command (DISCOM). There is no support command for the brigade; however, brigade units are supported by elements of COSCOM and DISCOM. Each of the seven support capabilities is performed by both COSCOM and DISCOM, except that the COSCOM has primary responsibility for ammunition and major end item supply and is not involved with water supply. The control and action unit capabilities of these commands will be discussed in the functional representation section of the FARO.

The scope of this representation has been limited in several ways (see para 2.4.1):

- Only the critical classes of supply are included (Class III - POL, Class IV - Engineer Construction materials, Class V - ammunition, and Class VII - major end items).

- Some control units of the COSCOM have been considered as control assets of the MMC because they are administrative in nature and do not perform an essential function from a modeling standpoint (Support Group Headquarters, Ammunition Group Headquarters).

- Similarly, the Transportation Composite Group/Brigade Headquarters is treated as an asset of the MCC, rather than as a separate unit, and the Supply and Transportation BN Headquarters and the Maintenance BN Headquarters are treated as assets of the DMMC.

- Combat Service Support of the separate brigade is not detailed. The COSCOM provides GS services to the separate brigade; DS services are provided by the separate brigade's organic Support BN, similar in function to the DISCOM.

- Brigade echelon covers only those aspects of brigade combat service support which are provided by DISCOM; brigade trains are not detailed.

- The Personnel and Administration Battalion is not included, since its Personnel Regulating Detachments are only intermediate stops for personnel en route to new units.

- Rear Area Protection (RAP) is not treated here, since in the combat service support functional area it involves CSS units protecting themselves, not the force as a whole.

- It should be remembered that the combat service support functional area will be changing between now and 1986. In addition, CSS commanders have considerable flexibility, and in practice may alter procedures described here.

3.2 Force Command and Control

3.2.1 General. This section describes the C^2 processes conducted by the force commander and staffs at each echelon, which plan, initiate, direct and coordinate the activity of the combined arms force. The Force Command and Control Representation Objectives (FC^2RO) describe a C^2 "cap" that will fit over the five functional areas represented in the FAROs and will cause the activities described in those areas to be carried out. Such a cap will serve as a basis for developing C^2 modeling constructs for a CORDIVEM model.

The processes detailed herein occur at the force C^2 nodes -- tactical and main command posts. The assets are those covered in the maneuver control FARO, namely the commander, staff personnel, automation equipment and communications links and equipment. A typical corps command and staff headquarters is shown in Figure 3. Division and brigade staffs are essentially comprised of subsets of these.

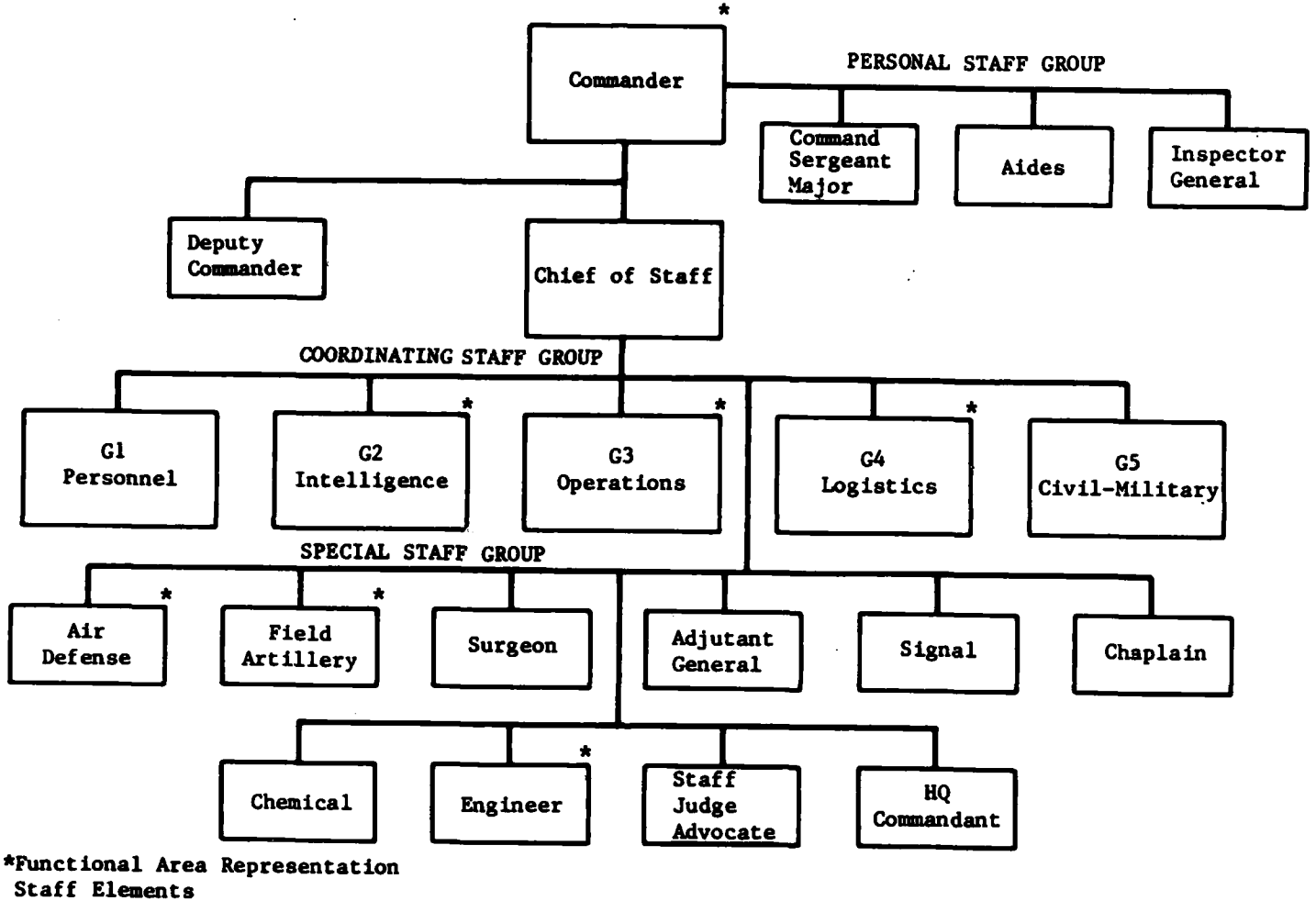

FIGURE 3
TYPE HEADQUARTERS

However, the FC^2RO seeks to distill the essence of force command and control so as to offer design objectives for a corps/division level model. As such, we address the force C^2 processes as if they were conducted using the structure shown in Figure 4. Here each functional area staff section is split into two parts: one part is that interface to the functional area as described in the FAROs on the boundary between the functional area and force control; the second part represents that staff capability to inform, advise and recommend to the commander in support of the force as a whole. Figure 4 also represents the command flow among subordinate and superior force C^2 elements as well as the coordinating and updating information flows among staffs at the various echelons.

Figure 4 is the building block structure used in the FC^2RO. The primary thrust here is to obtain a representation useful to a modeling construct. Essentially, after the initial operations orders are established, the five functional areas operate in concert but semi-independently of the force control processes. Information continues to flow among staff sections at various echelons. At critical junctures, either in time or situation, an operating change is required from either a functional area or higher headquarters which affects the force as a whole. It is then that the force C^2 processes come into play.

3.2.2 Force Level C^2 Processes. Figure 5 depicts the four processes that capture the essence of force control in the context defined above: monitoring the situation, identifying new missions and tasks as a result of the monitoring or because of directives from higher headquarters, making an estimate of the situation and selecting a particular course of action, and then either preparing/updating plans or preparing formal orders implementing the chosen course of action. Figure 5 shows that, for the purposes of this representation, the force C^2/functional area C^2 interface is in the monitoring process. Each functional area conducts monitoring which updates not only that functional area's understanding of the situation, but also that of the force as a whole. Deviations of the perceived current situation from the desired situation in a functional area that can be handled within that functional area will not trigger the force C^2 processes. Deviations that cannot be handled by the functional area processes or that occur because of directives from higher headquarters will trigger the force control processes. We exclude the possibility of the commander changing the plans or orders on a whim rather than on data gathered from the functional area. However, unexpected success in accomplishing missions should trigger the force C^2 processes to simulate the commander seizing the initiative.

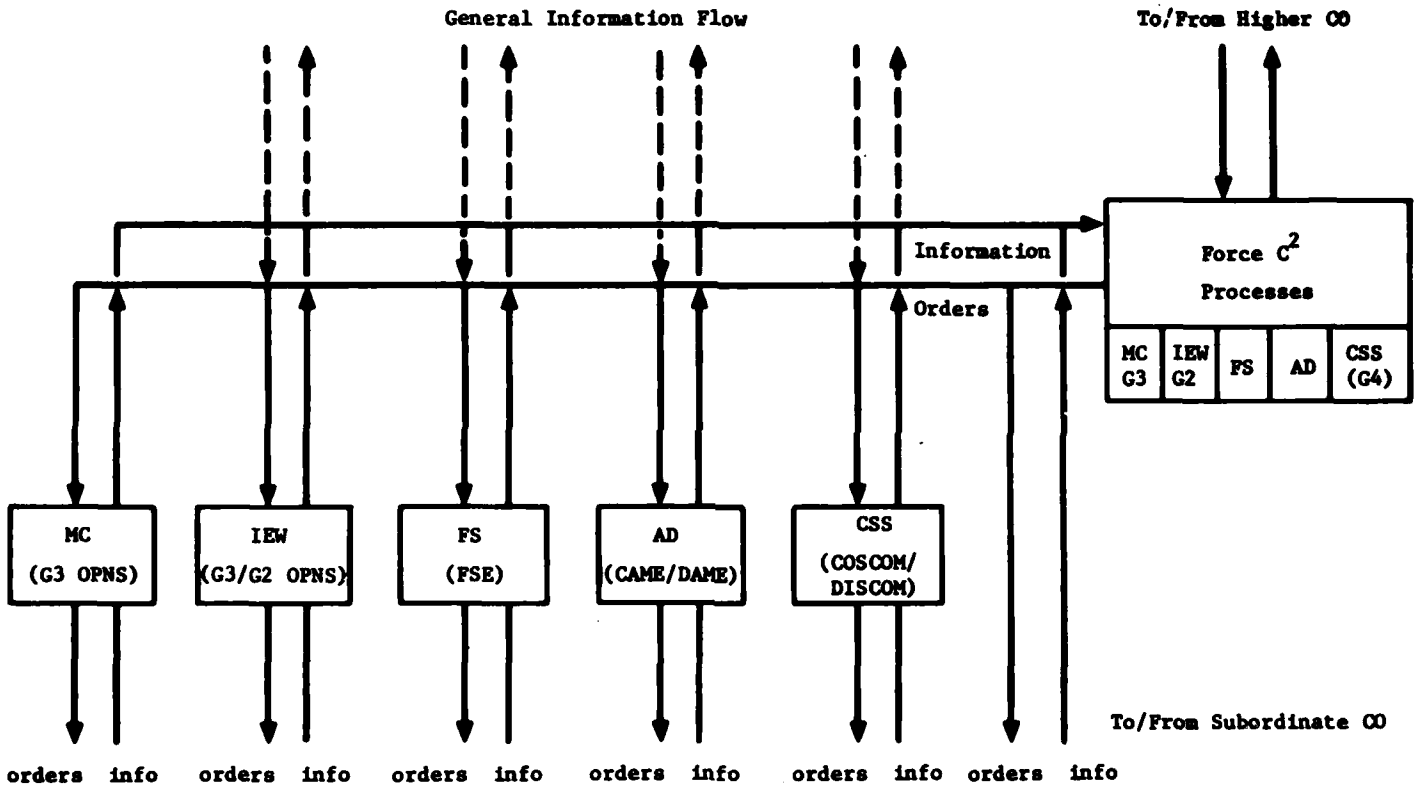

FIGURE 4
RECAST OF HEADQUARTERS FOR FORCE C^2 REPRESENTATION OBJECTIVES

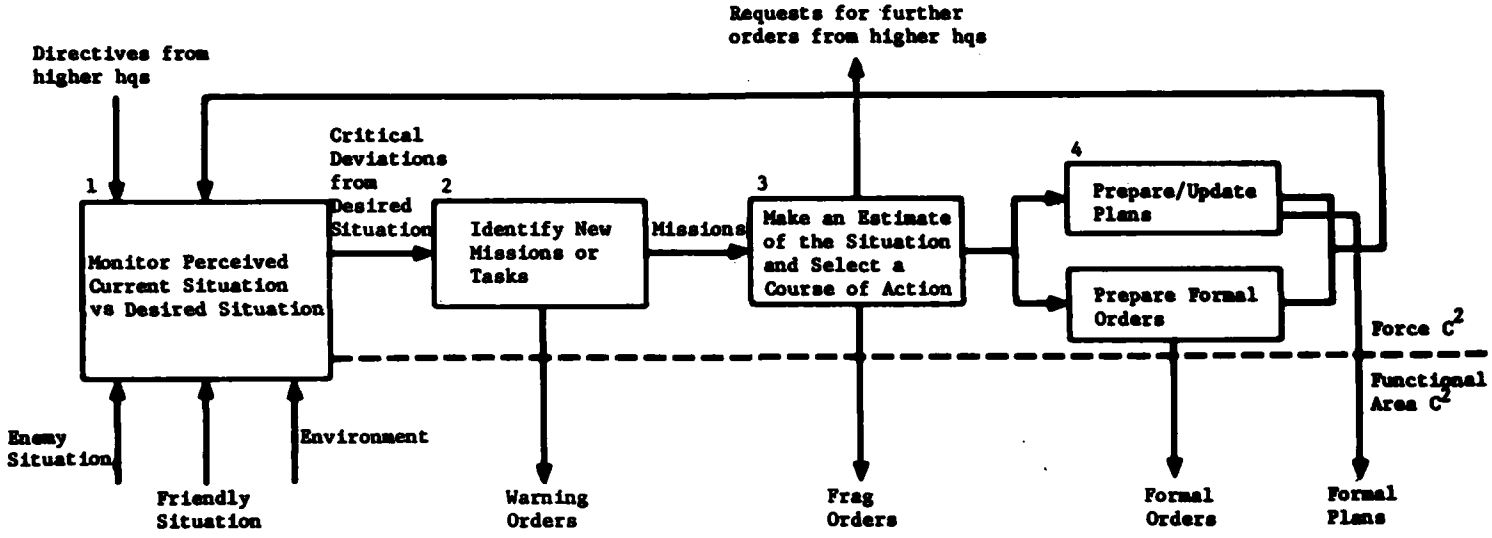

FIGURE 5
FORCE C^2 PROCESSES

Whether an order is generated or a plan, or whether the order is formal or fragmentary is dependent on the nature of the situation and the staff. Staffs at main CPs in general generate plans in support of future operations. Staffs at forward CPs generate orders for the immediate battle or the very near future. Fragmentary orders are used for rapid maneuver or fire support adjustments of the immediate battle.

4.0 APPLICATION AND USE OF THE FAROS

4.1 Design Objectives for the Corps/Division Level Evaluation Model

After the initial development of the functional area representation objectives in a format worked out by the AMMO-MITRE team, the FAROs were circulated to interested agencies for comment. Comments were incorporated as appropriate and revisions made to present to the Technical Assessment Committee (TAC), a select Army committee which was tasked to assess model design objectives and to evaluate candidate models for CORDIVEM. The committee reviewed the FAROs and other performance objectives to determine if they served a useful basis upon which to evaluate CORDIVEM candidate models and methodologies. While some limitations to the FAROs were pointed out, the committee accepted the FAROs not only as a basis for the assessment of selected candidate models, but also to serve as a guide for the future development of the CORDIVEM.

The technical assessment of model candidates concentrated on two existing models and one proposed new structure. The two candidates assessed were the wargame version of the Corps Division Evaluation Model being developed by the Combined Arms Studies and Analysis Activity (CASAA) at Ft. Leavenworth and the Vector 2 model operated at the TRADOC Systems Analysis Activity (TRASANA) at White Sands Missile Range. The proposed new structure was presented by the Jet Propulsion Laboratories (JPL). Also presented was the CASAA plan for future development of the wargame version of CORDIVEM.

The technical committee made several recommendations based upon the assessment and development plans presented. One of their primary concerns was toward providing a fully automated simulation capability by the end of calendar year 1982. With this in mind the committee made the following recommendations:

- Vector 2 be used as an interim CORDIVEM until development of a satisfactory replacement.
- Development of the CORDIVEM wargame version be continued as planned through February 1983.
- JPL initiate development of a new structure and present a detailed design plan for review and evaluation within six months.

4.2 Additional Utility

In addition to their application to the CORDIVEM assessment, the FAROs as developed have already been used in other areas. The "Red" FAROs are being developed by ITAC, the Intelligence and Threat Analysis Center, using the Blue FAROs as a guide. Design objectives for the force-level evaluation model (FORCEM) were being drawn up concurrently and the exchange of information facilitated the development of both levels. Linkages between the levels of the hierarchy are being worked on. As the CORDIVEM is the middle layer, the functions it covers and data requirements and products are important to both of the other models in the hierarchy. JPL's proposal for the new structure states that the FAROs will be incorporated.

Of a more general nature is the usefulness of the FAROs in helping all participants in the AMIP to stay oriented on the overall picture of what is to be represented in Army models. Each agency, school or center can better understand where its model or game contributes in the total force representation.

The AMIP effort has demonstrated the successful application of appropriate managerial techniques to the direction of Army analysis. The process of matching user requirements with functional area representation to derive design objectives provides the basis for the evaluation of current models and direction for future development. Continued application of these techniques will provide an ability to trace model design objectives and specifications to the user requirements and to modify the design objectives and specifications due to the changing needs of studies and analysis.

APPENDIX I

INTRODUCTION TO THE FUNCTIONAL AREA APPENDICES

Appendices III through VII are the Functional Area Representation Objectives (FARO's) for the functional areas of Maneuver Control, I/EW, Fire Support, Air Defense, and Combat Service Support, respectively. Each FARO details those items in its functional area which should be modeled in CORDIVEM; for a general overview of each functional area, see section 3.2.

Appendix II is a quick-reference section allowing the reader to rapidly ascertain what capabilities or what resolution is represented in any of the functional areas.

Appendix VIII, the Force Command and Control Representation Objectives (FC^2RO) is structured differently from the standard FARO. It orients on the major force C^2 processes, describing inputs, results, and timing of each process as well as the details of the process itself.

Section 2.1 of each FARO lists effects on each of the capabilities of that functional area, as well as the effects produced by carrying out those capabilities:

1) Effects of performing the capability
2) Combat effects on the capability
3) Effects of the environment on the capability
4) Situational factors
5) Effects from other functional areas.

The Functional Representation (section 2.2 of each FARO) covers the processes to be modeled, according to the following outline.

OUTLINE OF FUNCTIONAL REPRESENTATION SECTION OF FARO'S (Section 2.2)

A. Corps

1. Control units

a. Unit name

(1) Planning and situation assessment

(a) Assets
(b) Any non-standard effects (see standard effects section proceeding the functional representation in each FARO for listing of standard effects for each capability)

(2) Communications

(a) Assets
(b) Any non-standard effects

(3) Command and control

(a) Range of decisions and to whom disseminated
(b) Considerations used in making decisions
(c) Feedback to higher control units

b. Unit name

(1) Planning and situation assessment
(as above)

(2) Communications
(as above)

(3) Command and control
(as above)

2. Action units

a. Unit name

(1) Capability 1

(a) Assets
(b) Any non-standard effects
(c) Execution

(1) Description of initiating events
(2) Information feedback

(2) Capability 2
(same as (1) above; repeat for each capability of the unit)

b. Unit name
(same as a. above; repeat for all corps action units in the functional area)

B. Division
(same as A. above)

C. Brigade
(same as A. and B. above)

Throughout the appendices, brackets indicate the items which are deemed not critical for a near term version of CORDIVEM. Personnel are implied assets of action units unless specifically noted.

APPENDIX II

FUNCTIONAL AREA OUTLINES

This appendix consists of a quick-reference outline of the functional areas. It is intended as a supplement which will rapidly give the reader an overview of each area.

For each functional area and subfunctional area, the information covered includes the capabilities of the area as a whole, and for each echelon the control units and their assets, decisions of control units and considerations used in making those decisions, and action units with their assets. The decisions and considerations are presented as a single group for each echelon, not categorized by specific control unit as they are in the FARO appendices.

FUNCTIONAL AREA OUTLINES

I. MANEUVER CONTROL

A. Combat

1. Capabilities

a. Battle Planning/Situation Assessment
b. Battle Direction/Situation Assessment
c. Reconstitution Coordination/Planning
d. Reconnaissance/Surveillance Direction
e. Communication
f. Movement
g. Shooting

2. Control Units (Level of Resolution)

a. Corps

1. Main Command Post

(a) G2, G3 and other staff elements
(b) CP Signal Center
(c) Computers
(d) Staff
(e) Vehicles

2. Aviation Brigade

(a) Staff
(b) Radios

3. Rear Command Post

(a) COSCOM HQ Staff when colocated
(b) COSCOM Signal Center
(c) Computers

4. Armored Cavalry Regiment Command Post

(a) Staff
(b) Radios

5. Decisions

(a) Positioning of units
(b) Adjustments to -

(1) Resource allocation
(2) Scheme of maneuver
(3) Task organization

(c) Rear Area Combat Operations
(d) Reconstitution
(e) Movement/traffic control
(f) Timing of R/S efforts

6. Considerations for Decisions

(a) Mission/Commander guidance
(b) Status reports
(c) Intelligence reports
(d) Combat reports
(e) Requests for support
(f) Anticipated mission requirements

b. Division

1. Tactical Command Post

(a) Staff
(b) Tactical Radios/Communications

2. Main Command Post

(a) Staff
(b) Signal Center
(c) Computers

3. Rear Command Post

(a) Staff
(b) DISCOM HQ Staff (when colocated)
(c) DISCOM Signal Center
(d) Messengers tactical radios

4. Cavalry Brigade (Air Attack) (CB(AA))

5. Decisions

(a) Positioning of units
(b) Adjustments to -

(1) Resource allocation
(2) Scheme of maneuver
(3) Rear area combat operations
(4) Reconstitution
(5) Task organization

6. Considerations for Decisions

(a) Mission/Commander guidance
(b) Disposition of units
(c) Status reports
(d) Requests for support
(e) Combat reports
(f) Anticipated mission requirements
(g) Intelligence from I/EW elements at div main CP

c. Brigade

1. Maneuver Brigade Command Post

(a) Forward Area Signal Center
(b) Staff
(c) Messengers tactical radios

2. Decisions

(a) Positioning of units
(b) Resource allocation
(c) Mission planning for anticipated operations

3. Considerations for Decisions

(a) Mission/Commander guidance
(b) Unit status
(c) Requests for support
(d) Intelligence reports
(e) Combat reports

3. Action Units (Level of Resolution)

a. Corps

1. Armored Cavalry Squadrons
2. Air Cavalry Troop
3. Attack Helicopter Battalion(s)
4. Separate Brigade(s)

b. Division

1. Attack Helicopter Battalion(s)
2. Cavalry Squadrons

c. Brigade

1. Maneuver Battalions

B. Combat Support

1. Capabilities

a. Combat Support Planning and Direction
b. Airmobility Support (movement of ground forces)
c. Engineer Mobility/Countermobility
d. General Engineering (road, bridge repair, airfield construction, etc.)

e. Engineer Survivability Support (decontamination, water supply, etc.)
f. Movement
g. Communications

2. Control Units

a. Corps

1. Main CP Engineer Section

(a) Staff
(b) Corps Main CP Signal Center
(c) Messengers tactical radios

2. Main CP Aviation Section

(a) Staff
(b) Corps Main CP Signal Center and organic messengers and tactical radios

3. Decisions

(a) Task organization
(b) Allocation of assets
(c) Mission tasking

4. Considerations for Decisions

(a) Commander's Guidance/Missions
(b) Future requirements
(c) Requests for support - immediate and future
(d) Unit status

b. Division

1. Main CP Engineer Section

(a) Staff
(b) Engineer Combat BN HQ's
(c) Main CP Signal Center
(d) Messengers tactical radios

2. Main CP Aviation Section

(a) Staff
(b) Main CP Signal Center and organic tactical communications
(c) ACAB

3. Decisions

(a) Resource allocation
(b) Requesting additional support from corps
(c) Mission tasking of units
(d) Task organization

4. Considerations for Decisions

(a) Commander's Guidance/Missions
(b) Current and future operations, order, and plans
(c) Unit status
(d) Additional request for support

c. Brigade

1. Main CP Engineer Section

(a) Staff
(b) Main CP's Signal Facilities (including the Forward Area Signal Center)
(c) Messengers tactical radios

2. Main Command Post Aviation Section

(a) Staff
(b) CP Signal Facilities (to include FASC)
(c) Messengers tactical radios

3. Decisions

(a) Allocation of assets
(b) Unit taskings

4. Considerations for Decisions

(a) Commander's Guidance/Missions
(b) Current and future opords and plans
(c) Immediate requests for support
(d) Unit status

3. Action Units

a. Corps

1. Assault Helicopter Battalion
2. Assault Support Helicopter Battalion
3. Engineer Combat Battalion (Heavy)
4. Non-Tactical Bridge Companies
5. Atomic Demolition Company (ADM)
6. NBC Defense Company
7. Engineer Water Supply Company

b. Division

1. Combat Support Aviation Company
2. Engineer Combat Company
3. Tactical Bridge Company

c. Brigade

1. Combat Support Aviation Company (when in direct support)
2. Engineer Combat Company (in direct support)

II. INTELLIGENCE/ELECTRONIC WARFARE

A. Capabilities

1. Collection/Jamming/Fusion Management
2. Collection
3. Jamming
4. Fusion
5. Movement/Flying

B. Control Units

1. Corps

a. Corps Mission Management Element

(1) G2 Mission Management and Dissemination Staff
(2) CEWI Group CTOC Support Element Staff
(3) Technical Control and Analytical Element Staff
(4) Single Source Analytical Teams
(5) Computers
(6) Tactical Communications and CP Signal Center

b. Decisions

(1) Plan formulations
(2) Unit tasking
(3) Evaluation of usefulness of information
(4) Type information for tasking requirements
(5) Timing

c. Considerations for Decisions

(1) Commander's EEI
(2) Other intelligence requirements
(3) Requests for support - future and immediate
(4) Unit status
(5) Equipment capabilities
(6) Speed and intensity of battle
(7) General targeting requirements from FAS

2. Division

a. Division Mission Management Element

(1) G2 Collection Management and Dissemination Staff
(2) CEWI BN DTOC Support Element Staff
(3) Technical Control and Analytical Element Staff
(4) Single source analytical teams
(5) Computers
(6) CEWI BN EW support section and TCAE staffs
(7) Tactical communications and Div signal center

b. Decisions

(1) Plan development
(2) Unit tasking
(3) Selection of pertinent information
(4) Determination of required information
(5) Time requirements
(6) Required amount of assets
(7) Coordination of sensor emplacement with division FSE or Division G3

c. Considerations for Decisions

(1) Commander's EI
(2) Other intelligence requirements
(3) Immediate requests for support
(4) Higher level taskings
(5) Unit status reports
(6) System limitations
(7) General targeting requirements from FSE
(8) Sensor SIGINT reports

3. Brigade

a. Brigade S2

(1) Staff
(2) I/EW support element from the CEWI BN
(3) Tactical communications and Forward Area Signal Center

b. Decisions

(1) Requirement formulation
(2) Requirements for support approval/deny/reallocate

c. Considerations for Decision

(1) Subordinate unit requests
(2) Own unit needs
(3) Unit status reports

C. Action Units

1. Corps

a. Corps Fusion Center

(1) Staff
(2) Computer

b. Long Range Reconnaissance Patrols

(1) Tactical radios

c. SIGINT Sensors

(1) Ground and aerial COMINT and ELINT Sensors
(2) Processing centers
(3) Operators
(4) Tactical communications

d. Reconnaissance/Surveillance Sensors

(1) Photographic aircraft
(2) Side looking aerial radars
(3) Aerial imagery collectors
(4) Crews, fuel, operators, ground processing stations
(5) Tactical communications

e. Corps Level Jammers

(1) Jammers
(2) Operators
(3) Tactical communications

2. Division

a. Division Fusion Center

(1) Staff
(2) Computer

b. SIGINT Sensors

(1) Sensors
(2) Operators
(3) Communications
(4) Processing centers

c. Reconnaissance/Surveillance Sensors

(1) Radars
(2) Aerial platforms
(3) Crews
(4) Operators
(5) Fuel
(6) Ground processing stations and operators
(7) Communications

d. Remote Sensors

(1) Sensors and relays
(2) Operators
(3) Tactical communications
(4) Fuel (for generators)

e. Division Level Jammers

(1) Jammers and operators
(2) Vehicle (ground or aerial)
(3) Vehicle fuel
(4) Tactical communications

f. Long Range Reconnaissance Patrols

(1) Tactical radios

3. Brigade

a. Remote sensors

(1) Same as C2(d)

III. FIRE SUPPORT

A. Field Artillery

1. Capabilities

a. Planning and Situation Assessment
b. Communications
c. Delivery of Fires
d. Movement
e. Target Acquisition

2. Control Units

a. Corps

(1) Corps Field Artillery Section

(a) Operations and Intelligence Element
(b) Fire Support Element
(c) Communications (usually provided by Corps Signal Bde)
(d) FA Bde and Bn HQs under Corps Control
(e) Navy and Air Force personnel
(f) TACFIRE equipment

(2) Decisions

(a) Organization for combat
(b) Amplify Commander's guidance
(c) Assign priority of fires
(d) Assign targets to available assets
(e) Develop fire support plan
(f) Coordinate unit movement

(3) Considerations for Decisions

(a) Mission planning guidance from Corps Headquarters
(b) Nuclear/Chemical weapon availability
(c) Unit status
(d) Other fire support availability

(e) Target intelligence
(f) Requests for support
(g) Plan of maneuver
(h) Resource status

b. Division

(1) Division Fire Support Element

(a) Staff
(b) TACFIRE
(c) Division Signal Support Center
(d) Navy and Air Force personnel

(2) Division Artillery Tactical Operations Center

(a) Staff
(b) TACFIRE
(c) Attached Signal Center and organic communications assets
(d) Bn HQs (retained in General Support of Division)
(e) Attached FA Bde HQs that remain in GS of Division

(3) Decisions

(a) Organization for combat
(b) Amplify Commander's guidance
(c) Assign priority of fires
(d) Assign targets, zone, and priorities to assets
(e) Develop fire support plan
(f) Request additic al support
(g) Coordinate, determine unit movement

(4) Considerations for Decisions

(a) Mission planning guidance/restrictions
(b) Nuclear/Chemical weapon availability
(c) Unit status
(d) Other fire support availability

(e) Target intelligence
(f) Requests for support
(g) Plan of maneuver/current orders

c. Brigade

(1) Brigade FSE

(a) Staff, including Navy and Air Force personnel
(b) Organic communications assets
(c) DS Bn HQs
(d) TACFIRE data base

(2) Decisions

(a) Assign targets to assets
(b) Assign priority of fires
(c) Requests for additional support

(3) Considerations for Decisions

(a) Mission planning guidance/restrictions
(b) Nuclear/Chemical weapon availability
(c) Unit status
(d) Target intelligence
(e) Plan of maneuver/current orders
(f) Availability of other fire support means (NGF and Air Force)

3. Action Units

a. Corps

(1) General Support Battery (normally from missile or rocket Bns)

b. Division

(1) Firing units of attached FA Bns remaining in GS of Division
(2) Retained GS Batteries
(3) Target Acquisition Battery

c. Brigade

(1) DS Battery

B. Air Power

1. Capabilities

a. Communications
b. Delivery of Fire

2. Control Units

a. Air Support Operations Center (normally colocated with Corps TOC)

(1) Staff
(2) Organic communications (to include links with Corps FSE, TACPs, and Tactical Unit Operation Center)

b. Decisions

(1) Coordinate requests
(2) Order missions

3. Action Units

a. Aircraft Sorties

(1) Aerial Platforms
(2) Ammunition
(3) Forward Air Controller (for CAS)

C. Naval Gun Fire

1. Capabilities

a. Planning
b. Communications
c. Delivery of Fires

2. Control Units

   a. Naval Gun Fire Officer (at Bde or Div level in coordination with FSE)

      (1) Personnel
      (2) HF link to ships

   b. Decisions

      (1) Coordinate requests
      (2) Plan missions

3. Action Units

   a. Ships (General or Direct Support)

      (1) Spotters
      (2) Fire Direction Centers (on ships)
      (3) Type AMMO and weapons
      (4) Communications equipment

IV. AIR DEFENSE

A. Capabilities

1. Planning and Situation Assessment
2. Communications
3. Delivery of Fires
4. Movement

B. Control Units

1. Corps

a. ADA Group Operations Center (GOC)

(1) Staff
(2) Missile Minder System
(3) Communications links

b. GS Hawk Battalion Operations Center (BOC)

(1) Staff
(2) Missile Minder System
(3) Communications Links
(4) Organic intelligence section

c. SHORAD Battalion Tactical Operations Center (TOC)

(1) Staff
(2) Communications links

d. Decisions

(1) Weapon control restrictions
(2) Assign missions
(3) Provide sector of coverage
(4) Plan and order unit movement
(5) Assign targets

e. Considerations for Decisions

(1) Unit and capability status
(2) Air Defense warnings
(3) Weapon control status
(4) Friendly aircraft information and maneuver unit plans
(5) Target information
(6) Missions/orders
(7) AD unit status/location
(8) Ground - air situation from GS Hawk BOCs intelligence section
(9) Reports of target engagement or sighting
(10) Early warning from Air Force

2. Division

a. GSR HIMAD BOC

(1) Staff
(2) Missile Minder System
(3) Organic Communications
(4) Intelligence section
(5) Radars

b. SHORAD Battalion TOC

(1) TOC Staff
(2) Division Signal Center (multi-channel system)

c. Decisions

(1) Planning and ordering unit movements
(2) Tasking fire units
(3) Assigning targets/sectors of fire
(4) Planning unit defense in support of plans
(5) Advising commander on AD priorities

d. Considerations for Decisions

(1) Mission/orders
(2) Target information
(3) Unit status

(4) Current sectors of fire
(5) Friendly and enemy aircraft information
(6) Ground and air situation reports from GSR Hawk BOC's intelligence section

C. Action Units

1. Corps

a. GS HIMAD Battery
b. SHORAD Battery

2. Division

a. GSR HIMAD Battery
b. SHORAD Battery

3. Brigade

a. DIVAD Battery

V. COMBAT SERVICE SUPPORT

A. Capabilities

1. Planning and Situation Assessment
2. Communications
3. POL Supply
4. Ammunition Supply
5. Maintenance
6. Personnel Replacement
7. Medical Care
8. Water Supply
9. Class IV and VII Supply

B. Control Units

1. Corps

   a. COSCOM Headquarters

      (1) Staff
      (2) Automatic Data Processing Center (ADPC)
      (3) Communications equipment and links (organic signal center)

   b. Materiel Management Center

      (1) Staff
      (2) ADPC
      (3) Communications equipment and links

   c. Movement Control Center

      (1) Staff
      (2) Communications equipment and links

   d. Medical Group Headquarters

      (1) Staff
      (2) Communications equipment and links

e. Decisions

(1) Develop plans
(2) Recommend priorities and allocations
(3) Direct storage and distribution
(4) Coordinate movement - assign movement tasks
(5) Tasking for medical evacuation and maintenance service

f. Consideration for Decisions

(1) Supply class status
(2) Maintenance status
(3) Transportation status
(4) Request for support
(5) Resource allocation directives
(6) Unit status reports

2. Division

a. DISCOM Headquarters

(1) Staff
(2) Division Data Center
(3) FASCO
(4) Communications equipment, links, and signal center

b. Division Materiel Management Center

(1) Staff
(2) Division Logistics System
(3) Maintenance Reporting and Management System
(4) Computer terminals
(5) Communications equipment and links
(6) Supply and Transportation Battalion Headquarters
(7) Maintenance Battalion Headquarters

c. Medical Battalion Headquarters

(1) Staff
(2) Communications equipment and links

d. Decisions

(1) Allocate assets (including those used in reconstitution and RACO)
(2) Organize unit movement
(3) Determine stockage lists and PLL
(4) Procure and direct distribution of supplies
(5) Plan location of supply distribution points
(6) Determine patients for evacuation
(7) Task units
(8) Authenticate ammunition requests

e. Considerations for Decisions

(1) Commander's and policy guidance
(2) Status of supply/support
(3) Requests for supply/support
(4) Combat casualty status reports

C. Action Units

1. Corps

a. POL Supply Battalion

(1) Petroleum Supply Company and supply points
(2) Transportation Medium Truck Company
(3) Communications equipment

b. Ammunition Battalion

(1) Ammunition Supply Company's and their ASP's
(2) Special Ammunition DS Company and its SASP's
(3) FSL's
(4) Communications equipment

c. Motor Transport Battalion

(1) Communications equipment
(2) Transportation Light Truck Company

d. Aviation Battalion

(1) Assault Support Helicopter Company
(2) Communications equipment

e. Maintenance Battalion, DS

(1) HQs and HQs Detachment
(2) Three to five maintenance companies
(3) Four augmentation teams
(4) Repair parts stock
(5) Operational readiness float of critical end items
(6) Communications equipment

f. Maintenance Battalion, GS

(1) HQs and HQs Detachment
(2) Maintenance Companies
(3) Maintenance support teams
(4) Communications equipment

g. Transportation Aircraft Maintenance Battalion

(1) HQs and HQs Detachment
(2) TAM Companies
(3) Maintenance support teams
(4) Communications equipment

h. Missile Support Battalion

(1) Communications equipment
(2) Maintenance Companies

i. Ambulance Companies

(1) Aircraft
(2) Communications equipment
(3) Vehicles

j. Corps Hospitals

(1) Hospitals
(2) Medical supplies and equipment
(3) Communications equipment

k. Supply and Service Battalion

(1) Heavy Materiel Supply Company
(2) General Supply Company
(3) Communications equipment

2. Division

a. Supply and Service Company

(1) POL distribution points
(2) POL reserves
(3) Communications equipment
(4) Water purification equipment
(5) Water distribution points

b. Transportation Motor Transport Company

(1) Vehicles
(2) Communications equipment

c. Maintenance Companies (Light, Heavy, Missile Support)

(1) Maintenance support teams
(2) Maintenance parts stock
(3) Operational Readiness Float
(4) Communications equipment
(5) Vehicles

d. Transportation Aircraft Maintenance Battalion (Airmobile DISCOM)

(1) Aircraft repair parts
(2) Aircraft maintenance teams
(3) Communications equipment
(4) Aircraft

e. Medical Support Company

(1) Trained personnel
(2) Vehicles (air and ground)
(3) Medical supplies
(4) Clearing stations
(5) Communications equipment
(6) Air Ambulance Platoon (Airmobile Division)

3. Brigade

a. ATP's
b. Forward Detachment of Supply and Transport Battalion
c. Forward Company of the Maintenance Battalion
d. Forward Support Medical Company

VI. FORCE COMMAND AND CONTROL

A. Capabilities

1. Monitoring the Current Situation

   a. The Immediate Battle
   b. The Future Battle
   c. Rear Areas
   d. Execution of Future Plans or Contingencies
   e. Periodic Review

2. Identification of New Missions or Tasks

   a. Objective
   b. Mission
   c. Intermediate Objectives
   d. Time

3. Estimate of Situation and Courses of Action

   a. Enemy/Friendly Comparison
   b. Development of Courses of Action
   c. Risk Analysis
   d. Decisions
   e. Time

4. Preparation of Plans and Orders

   a. Staff input
   b. Documentation
   c. Dissemination
   d. Time

B. Ties to Functional Area C^2 Elements

1. Considerations used in Functional Area C^2 Decision Making
2. Information Feedback from Functional Area C^2 Elements

APPENDIX III

MANEUVER CONTROL FUNCTIONAL AREA REPRESENTATION OBJECTIVES

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1.0 COMBAT SUBFUNCTIONAL AREA REPRESENTATION OBJECTIVES

Figure III-1 depicts the units described in the combat subfunctional area. At the corps echelon, the control units include the corps Main, Rear and Tactical (or forward) command posts (CPs). The Tac CP is not included explicitly since it serves primarily as a backup or alternate main CP. Information flows to the Tac CP are noted in the outline to includes its role as a backup, but no autonomous role is described. The action units at corps include the combat aviation elements (the Attack Helicopter Battalion), the covering force and rear area security elements (the Armored Cavalry Regiment) and the corps reserve (the separate brigades). The separate brigades are not detailed explicitly in the outline, although they should be modeled explicitly, because although they are usually augmented from corps assets they act and are controlled in a manner similar to the divisional brigades shown at the bottom of Figure III-1. The difference is the direct linkages to the corps Main CP.

At division, the three types of headquarters -- main, tac, and rear -- are all distinct actors and merit explicit modeling. Divisional action units for combat include the attack helicopter battalions and the cavalry squadron which are both found in the Cavalry Brigade (Air Attack) (CB(AA)). The CB(AA) is a tactical headquarters with a full planning staff and is worthy of explicit modeling. In a similar manner, the Corps Aviation Brigade is worthy of explicit modeling.

At brigade, the main CP is shown as the principal control unit. While some brigades may employ a forward or tactical CP, they would be employed as an extension of the main through the use of a command group, not really constituting a long standing control unit with separate functions to perform. The brigade trains could also be considered for inclusion as a control unit except that their role is more that of combat service support. Brigade action units include the infantry, mechanized, tank, air assault and airborne battalions and the direct support Attack Helicopter Battalions from either corps or division.

Signal units are not included per se in this paper due to the observation that the capability to communicate is the real issue, and not the capability to install or operate communications systems.

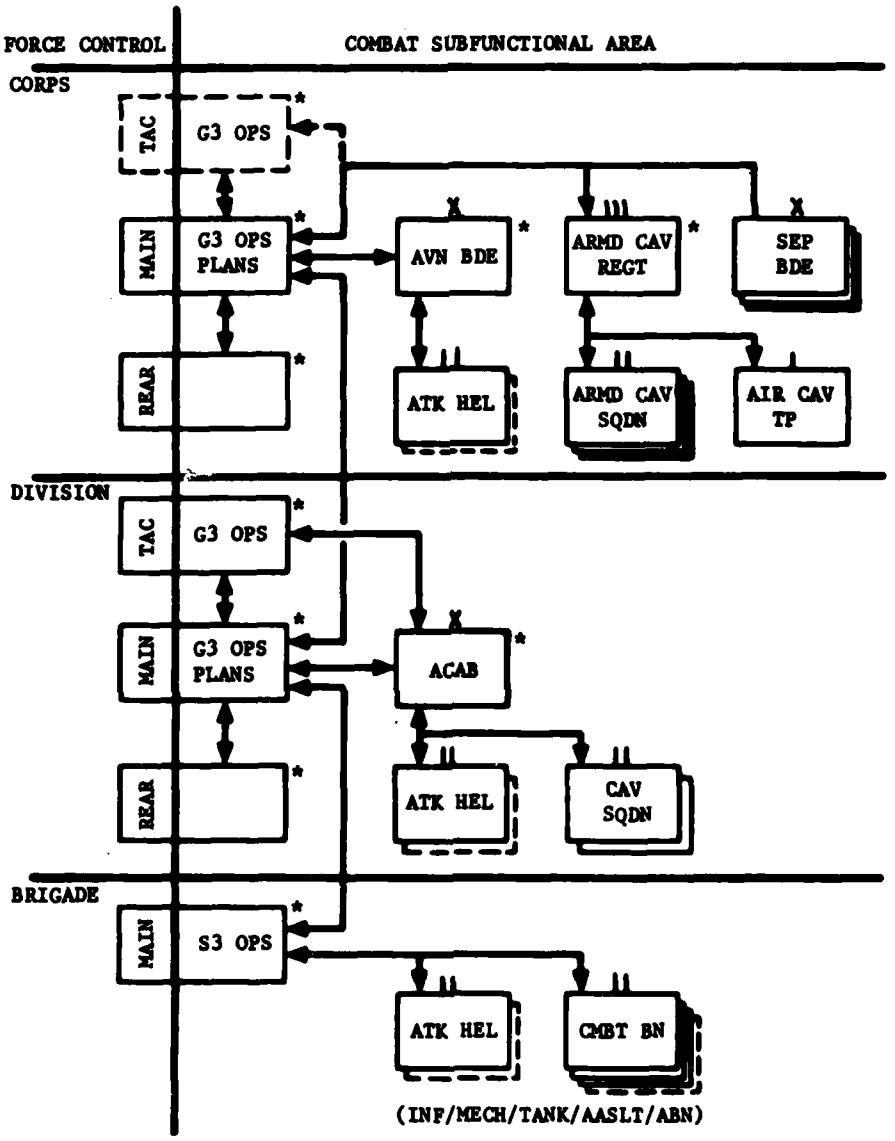


FIGURE III-1
COMBAT SUBFUNCTIONAL AREA

1.1 Effects

The following sections describe five major categories of effects which are caused by the execution of a capability, or which affect the execution of that capability.

1.1.1 Effects of Executing the Capability on Targets, the Environment, and Assets

This section deals with how the execution of a function or capability will have certain effects on the enemy, terrain, and friendly elements.

1.1.1.1 Planning/Direction/Situation Assessment. There are no direct immediate effects on the battlefield from these functions.

1.1.1.2 Communications. There are no direct effects on the battlefield by communications.

1.1.1.3 Movement. Moving units occupy space on roads, bridges and in fields which can delay other unit movements through that area, due to passage of lines considerations and traffic congestion. Movement also causes an operational degradation of the vehicles employed, and fuel is consumed. Heavier vehicles including tanks, armored personnel carriers, and trucks can seriously damage roads and bridges so that following traffic is delayed or even denied the use of a particular road, depending on the condition of the road to start with, the weight and speed of the vehicle, and the prevailing weather conditions.

1.1.1.4 Shooting. The principal effects of shooting on the battlefield are the suppression, damage or delay of the enemy forces, the "dirtying" of the battlefield due to smoke and dust caused by firing, the consumption of ammunition and POL, and the fact that other friendly units must consider the presence of fields of fire when moving. Shooting also causes operational degradation of the weapons.

1.1.2 Combat Effects on the Capability

This section details the effects of enemy action on friendly units ability to perform the capabilities listed.

1.1.2.1 Planning/Direction/Situation Assessment. Headquarters are subject to enemy attacks from both conventional and unconventional (nuclear/

chemical) means. In the conventional arena, they are subject to direct support and interdiction aircraft attack, direct ground attack, and indirect fire. They are also subject to the direct effects of an enemy nuclear attack including blast, thermal and radiation effects. Control functions can be severely degraded if personnel are required to wear protective garments either in anticipation of or response to a nuclear or chemical attack. [Transient radiation effects on electronics (TREE) and electromagnetic pulse (EMP) nuclear effects will degrade/destroy control units electronic gear, especially computers and communications gear.]

1.1.2.2 Communication. Communication is subject to both conventional and unconventional effects. Signal centers on the ground and satellites in space are both subject to direct attack and jamming. Signal centers can be attacked as well by direct support, and interdiction aircraft or indirect fire attack in the nuclear/chemical arena. [TREE and EMP can severely degrade communications facilities and equipment], and either radiation or chemical contamination will degrade the function of communications due to a requirement either to decontaminate the gear or to wear protective garments.

1.1.2.3 Movement. Moving friendly units are subject to conventional attack in the form of direct and indirect fire, direct support and interdiction aircraft attacks, and air to air or air defense attacks. In the nuclear/chemical arena, blast, heat and radiation will directly affect moving vehicles and personnel [TREE and EMP will have detrimental effects on aircraft avionics and radiation/chemical agent contamination will induce personnel sickness] and indirectly degrade performance through requiring the use of protective garments.

1.1.2.4 Shooting. Enemy conventional attacks of all types can suppress, damage, or destroy a units' ability to shoot either by the directly destroying the weapons, the personnel and/or the ammunition. Nuclear and chemical attacks will damage equipment and personnel due to blast, heat and radiation [and lingering contamination sickness for chemical attacks]. The use of protective gear will degrade shooting performance.

1.1.3 Environmental Effects on the Capability

This section describes both the effects on the capability caused by natural environmental conditions (weather, visibility, terrain, etc.) and by man-made alterations to the environment (nuclear/chemical) for each capability listed.

1.1.3.1 Planning/Direction/Situation Assessment. Control functions are basically independent of weather, visibility and/or terrain effects. The same nuclear and chemical effects described in section 1.1.2.1 apply here as well.

1.1.3.2 Communications. Communications signals are subject to attenuation due to range, atmospherics and terrain masking. [Particular concern is weather induced equipment failure which will delay or deny communications.]

1.1.3.3 Movement. The condition of roads and bridges will determine the speed, weight, and volume of traffic passable on selected routes. Lateral unit movements will depend greatly on the design of road network, which is basically fixed. Difficult terrain, and adverse weather will delay or deny ground movement and/or air flight. Adverse weather conditions can enhance combat unit mobility, i.e., frozen ground.

1.1.3.4 Shooting. Visibility restriction caused by darkness, or adverse weather conditions will hamper weapons effectiveness due to degraded target acquisition, classification and weapons guidance. Difficult terrain may cause degraded shooting performance while moving.

1.1.4 Situational Factors

This section deals with those status related factors which affect particular capabilities.

1.1.4.1 Planning/Direction/Situation Assessment. In most cases, control units are limited in their ability to perform their principal roles of planning, direction and situation assessment when forced to displace. This is particularly true in the case of the higher echelon command posts.

1.1.4.2 Communication. Communications on the move is restricted to tactical radios. Net congestion will determine a units ability to communicate.

1.1.4.3 Movement. The principal situational effects on movement are the availability of major end items (vehicles) and fuel.

1.1.4.4 Shooting. A units' ability to shoot depends on the number of weapons available and the ammunition available. Engaged units cannot be used elsewhere without involving a time delay to make the transition, and also some damage involved due to withdrawing from one battle to enter another. Sustained shooting operations are affected by the status of organic resupply elements, such as the FARP for combat aviation units.

1.1.5 Effects from Other Functional Areas

This section deals with the effects on the capabilities listed caused by non-combat functions.

1.1.5.1 Planning/Direction/Situation Assessment. Control units are usually dependent on combat support to establish or displace command posts. Fuel for power generators, maintenance, and personnel support is dependent on the combat service support (CSS) functional area.

1.1.5.2 Communication. For the purposes of a corps/division level model, the signal facilities used by combat control which are provided by signal units are assumed to be organic assets of the combat control units. Fuel and maintenance support, however, is dependent on the CSS functional area. [Replacement of satellites damaged or lost is dependent upon echelons above corps (EAC) support.]

1.1.5.3 Movement. Movement of combat units depend on vehicle supply, maintenance, and fuel supply from the CSS functional area. Tactical units can require engineer and/or aviation mobility support from the combat support functional area. [Aviation unit movements depend greatly on the supply of trained pilots from the CSS functional area, to fly the aircraft.]

1.1.5.4 Shooting. A combat units' ability to engage the enemy is dependent upon weapons supply, maintenance, and fuel supply from the CSS functional area. [Trained weapons crews are also required from the CSS area to replace dead or wounded personnel.]

1.2 Functional Representation

The following sections describe in detail the execution of the capabilities of essence to combat as they are performed by the control and action units shown.

1.2.1 Corps Echelon

1.2.1.1 Corps Control Units

1.2.1.1.1 The Corps Main Command Post

Battle Planning/Situation Assessment - The Corps Main CP uses the G3 Plans section for battle planning, and the G^2 section and Corps Tac CP for

situation assessment. Computers are used in both functions as reference aids concerning the action unit status and battle situation. There are no special effects to be noted here that have not been detailed in the above effects section.

Communications - The Corps Main CP uses the Corps Main CP Signal Center which includes satellite, multichannel and RATT systems, along with tactical radios and messengers.

Movement - The Corps Main CP uses its own staff and organic vehicles to displace. The Corps Tac CP is used as an alternate command post to provide continuity of operations while the Main is moving. The capability for battle planning, situation assessment and communications at corps during such a movement is limited by the level of support given by the Tac CP during this period.

Command and Control - In the exercise of command and control over the corps level combat action units, the Corps Main CP makes the following range of decisions:

- The broad positioning of major action units
- On-going adjustments to resource allocation, scheme of maneuver and task organization of major action units
- Movements are planned and coordinated for major action units and their associated ADA and combat support elements.

These decisions are disseminated to the division Main CP's, the ACR, the Aviation Brigade, Separate Brigades, and the ADA and engineer groups at corps.

In making these decisions, the Corps Main CP considers the following:

- The corps commander's guidance
- Mission tasking from corps OPORD in effect
- Action unit status reports from division Main CP's, ACR/Aviation/ Separate Brigade Main CP's
- Reported intelligence, weather, and terrain from Corps I/EW elements and EAC sources

- Combat information from corps level action units
- Requests for support from corps level action units and division Main CP's.

The following information is fed to higher or lateral headquarters as a result:

- Requests for additional assets or intelligence support to EAC or adjacent corps
- Condensed action unit status reports and corps OPLANS in effect to corps Rear CP, corps Tac CP, and/or COSCOM Headquarters.

1.2.1.1.2 The Corps Aviation Brigade. The Corps Aviation Brigade is a parent organization for many aviation units, including the corps Attack Helicopter Battalion(s). It can be used as a separate aviation brigade under corps control and modeled similarly to the Armored Cavalry Regiment with full planning, command and control functions, as described below.[27]

Combat/Reconnaissance/Surveillance - The principal asset of the corps aviation brigade CP for planning and force direction is its own staff.

Communications - The Corps Aviation Brigade CP communications assets are tactical radios.

Command and Control - The Corps Aviation Brigade main CP is responsible for the following decisions:

- Placement of corps aviation brigade combat and R/S elements
- Timing of the R/S effort
- Planning for future operations to include resource allocation, scheme of maneuver, task organization, combat support requirements
- Decisions concerning additional resources required to complete current missions (requests made to corps main CP)

In making these decisions, the following considerations are used:

- Corps commander's guidance
- Corps aviation brigade commander's guidance
- Planned mission tasking (from corps OPORD)
- Immediate mission direction (FRAGORDS) from corps main CP
- Action unit status (from Corps Aviation Brigade action units)
- Enemy situation/status (from Corps CP and from Corps Aviation Brigade action units)
- Anticipated missions (from corps main CP)
- SITREPS and immediate requests for support (from Corps Aviation Brigade action units)
- Action unit status reports (from Corps Aviation Brigade units)
- Reported enemy intelligence (from corps main CP)
- Immediate combat information (from Corps Aviation Brigade action units and corps main CP)

The following items are reported or requested to the Corps main and Tac CPs:

- Reports of observed enemy activity
- Action unit status reports
- Requirements for additional support to carry out immediate mission
- Corps Aviation Brigade operations plans or upcoming missions forwarded for approval along with requests for future additional support (if needed)

1.2.1.1.3 The Corps Tac CP. As noted in the introduction, the Corps Tactical CP is an intermediate headquarters for the Corps Main CP for the purposes of situation assessment and movement. The Tac basically maintains a dual records system alongside the Main in the event of the loss or damage to the Main. The Tac also serves as a temporary Main during the Main's displacement. There are no significant independent functions of the Corps Tac CP which warrant explicit modeling.

1.2.1.1.4 The Corps Rear Command Post

Rear Area Combat Planning/Direction - In the planning for and direction of rear area combat operations (RACO) the Corps Rear CP uses its own staff as its principal asset. In those cases where the Rear CP is colocated with the COSCOM Headquarters, the COSCOM HQ staff should be considered as an augmentation to the Rear CP for planning purposes.

Reconstitution Planning/Coordination - The assets used for this function are identical to those used above (except for a greater use of computer data bases to aid in unit reconstitution monitoring). Again the COSCOM HQ staff is heavily involved in reconstitution efforts and can be considered, when colocated with the Rear CP, as an asset of the Rear CP for reconstitution planning and coordination.

Communications - The Corps Rear CP relies on the COSCOM Signal Center which includes multichannel and RATT systems, and tactical radios.

Command and Control - The Corps Rear CP makes the following range of decisions in RACO planning/direction and Reconstitution Planning/ Coordination:

- Resource allocation to the force designated as the rear area security element
- Requests to CSS functional area and EAC sources of supply for personnel replacement, major end item replacement/maintenance, medical evacuation.
- Coordination of refugee movement and traffic control in the corps rear area

In making these decisions, the Corps Rear CP considers the following:

- Corps OPORD in effect
- Corps commanders guidance
- Major action unit status reports from the Corps Main CP
- Reported intelligence, weather and terrain from I/EW elements at Corps Main CP

The following items are fed back to higher or lateral headquarters:

- RACO situation reports to Corps Main CP
- Reconstitution reports to Corps Main CP
- RACO mission plans to Corps Main CP for approval.

1.2.1.1.5 The Armored Cavalry Regiment Main CP

Reconnaissance/Surveillance/Covering Force Planning and Direction - The principal asset of the ACR Main CP for planning and force direction is its own staff.

Communications - The ACR Main CP communications assets are tactical radios. In the covering force role, the ACR will require special communications support (typically radio relays) to maintain the tasking/reporting link to the Corps Main CP.

Command and Control - The ACR Main CP has the following range of decisions:

- Placement of ACR action units
- Timing of the R/S effort including direction to push ahead, withdraw, hold, etc.
- Planning for future operations to include resource allocation, scheme of maneuver, task organization, combat support requirements. (Sent to corps main CP for approval and then to ACR action units for implementation.)
- Decisions concerning additional resources required to complete current mission (requests made to corps Main CP)

In making these decisions, the ARC considers the following:

- Corps commander's guidance
- ACR commander's guidance
- Planned mission tasking (from corps OPORD)
- Immediate mission direction (FRAGORDS) (from corps main CP)
- Action unit status (from ACR action units)

- Enemy situation/status (from ACR action units)
- Anticipated missions (from corps Main CP)
- Sit reps and immediate requests for support (from ACR action units)
- Action unit status reports (from ACR action units)
- Reported enemy intelligence (from corps main CP)
- Immediate combat information (from ACR action units and corps main CP)

The following items are reported or requested as a result:

- Reports of observed enemy activity
- Action unit status reports
- Requirements for additional support to carry out immediate mission
- ACR operations plans for upcoming missions forwarded for approval, along with requests for future additional support (if needed)

1.2.1.2 Corps Action Units

1.2.1.2.1 Armored Cavalry Squadrons (ACR)

Reconnaissance/Surveillance - In the execution of reconnaissance/surveillance (R/S) efforts, the Armored Cavalry Squadrons of the ACR use armored reconnaissance vehicles and tanks, armored personnel carriers (APC's) vehicle fuel and tactical radios. R/S efforts are initiated by both planned mission tasking (OPORDs) and fragmentary orders of a more unplanned nature from the ACR Main CP. The Armored Cavalry Squadrons report mission status, enemy status, action unit status, NBC and obstacle reports to the ACR Main CP as information feedback from R/S.

Shooting - The Armored Cavalry Squadrons of the ACR use organic 155mm SP howitzers, mortars, machine guns mounted on armored reconnaissance vehicles, tanks, APC's, and the attendant ammunition when called upon to engage the enemy. Usually this level of engagement is light and focuses on economy of force. Considerable maneuvering takes place during shooting, and in this sense, vehicle fuel is essential for the use of the Armored Cavalry Squadrons in an engagement.

The Armored Cavalry Squadrons engage the enemy in response to planned (OPORD) mission tasking and unplanned FRAGORDs from the ACR Main

CP. In addition, the squadrons will engage defensively if attacked during a R/S effort. In order to use the howitzer battery for nuclear or chemical fires, nuclear or chemical release must be in effect (which comes from the corps commander).

An engaged Armored Cavalry Squadron will report known enemy status, action unit status, tactical nuclear or chemical fire mission confirmation, and POWs captured to the ACR Main CP.

1.2.1.2.2 Air Cavalry Troop (ACR)

Reconnaissance/Surveillance - The ACR has an Air Cavalry Troop which uses observation and attack helicopters and aviation fuel for R/S efforts. The Air Cavalry Troop does R/S in response to planned mission tasking (OPORDs) and unplanned tasking (FRAGORDs) from the ACR Main CP. In addition, the Air Cavalry Troop will exercise some degree of autonomy in the R/S effort as discovered enemy elements will spark immediate R/S efforts by the troop to bound enemy locations without specific directives from the ACR Main CP.

The Air Cavalry Troop sends mission status, enemy status, action unit status, NBC and obstacle reports to the ACR Main CP as information feedback from R/S efforts.

Shooting - The Air Cavalry Troop uses attack helicopters with anti-personnel and anti-armor weapons, and the attendant ammunition and aircraft fuel to engage enemy elements as directed. Engagements are initiated by planned tasking (OPORDs), and unplanned tasking (FRAGORDs) from the ACR Main CP. In addition, air cavalry assets which receive fire from overflown enemy elements will return defensive fire. The information feedback to the ACR Main CP includes known enemy status, action unit status and mission status.

1.2.1.2.3 Attack Helicopter Battalion(s)

Movement - The attack helicopter battalion(s) under corps control will move as a unit using organic trucks; attack, observation, and utility helicopters; and fuel to carry ground support and mission equipment. Movement is initiated either by planned or unplanned tasking from the Corps Aviation Brigade CP (OPORD/FRAGORD) or by the receipt of enemy fire which requires defensive repositioning. In the case of the attack helicopter battalion(s), tasking and reporting will flow through the Corps Aviation Brigade as a tactical headquarters. Information sent this way to the Corps Aviation

Brigade includes checkpoint and route coordination, new location, action unit status upon arrival, any enemy information gathered during the move, and NBC and obstacle reports.

Shooting - Attack helicopter battalion(s) give the corps commander a responsive combat arm. They use attack helicopters with antipersonnel and antiarmor weapons, observation helicopters (for target location and description), aviation fuel, and ammunition in order to engage the enemy. These units engage the enemy in response to planned/unplanned mission tasking (OPORDs/FRAGORDs) from the Corps Aviation Brigade CP. In addition, they will employ defensive fires against enemy attacks while positioning without any specific tasking to do so. The attack helicopter battalion(s) report back to the Corps Aviation Brigade CP.

1.2.1.2.4 Separate Brigade(s). The Corps level separate brigade(s) are task organized by the corps force control elements and used primarily as a corps reserve force or for special deep battle operations. While they are normally larger than a divisional brigade, their functions and the command and control within the brigade are similar. For these reasons, the separate brigades are not detailed here. For modeling, an augmented divisional brigade with command and control links directly to the Corps Main CP will suffice.

1.2.2 Division Echelon

1.2.2.1 Control Units

1.2.2.1.1 The Division Tactical Command Post

Battle Direction/Situation Assessment - The Division Tactical CP is responsible for the direction of the immediate battle and the main training of an up to date situation assessment to support that direction. In these functions, it relies on the Division Tac CP staff as its sole asset.

Communications - The Division Tac CP uses tactical radios to maintain communications contact with the divisional action units and the Division Main CP.

The range of decisions made by the Division Tac CP include:

- On-going adjustments to resource allocation to brigades in support of the immediate battle (directives sent to divisional action units and brigade Main CP's involved)
- Positioning of divisional R/S action units (cavalry squadron TOC's)

The Division Tac CP considers the following in making these decisions:

- Division OPORD in effect
- Division commander's guidance
- Disposition of corps R/S assets (ACR) (from corps main CP/OPORDS)
- Action unit critical status reports (from brigade main CP's and cavalry squadron TOC's)
- Requests for immediate support (from division action units and brigade CP's)
- Combat information of immediate concern (from corps/division main CP's)
- Reports on operations of brigades to the side of the area of immediate concern to the division Tac CP (from the division main CP)

The Division Tac CP reports the following to higher/lateral headquarters as a result:

- Combat information reported by action units sent to Corps/Division/ Brigade Main CP's
- Requests for immediate support to Corps Main CP

1.2.2.1.2 The Division Main Command Post

Battle Planning/Situation Assessment - The Division Main CP uses its staff and computer assets to plan for the future battle and situation assessment. The Division Main CP is responsible for taking the broad guidance from the Division commander, and the current Corps OPORD and developing an OPLAN for the division. In doing so, it draws on information from the divisional action units and its own computer data bases.

Communications - The Division Main uses its own signal center which includes satellite, multichannel and RATT systems. In addition, the main can use messengers and tactical radios for communications.

Command and Control - The Division Main CP develops divisional operations plans (OPLANS) for the direction of the division and brigade echelon action units. These plans include resource allocation decisions, task

organization down to the battalion level, and scheme of maneuver. The Main also coordinates future division operations support with the Corps Main CP and develops coordinated movement plans for major action units and their associated ADA and combat support elements. In making these decisions, the division Main uses the following considerations:

- Division commander's guidance
- Division mission tasking (OPORD in effect from corps main CP)
- Division Tac CP decisions (monitored)
- Action unit non-critical status reports (from action units)
- Proposed operations plans (from brigade main CP's and cavalry squadrons)
- Combat reports from divisional action units and the division Tac CP

The division Main will send the following items to higher or lateral headquarters as information feedback as a result:

- Division oplans reported for approval along with requests for additional support (to corps main CP)
- Action unit non-critical status reports (to corps main CP and division rear CP)
- Division OPLANS sent to division rear CP for coordination of reconstitution, and rear area combat operations
- Movement plans are sent to action units and ADA and Engineer battalions at division

1.2.2.1.3 The Division Rear Command Post

Battle Planning/Direction of Rear Area Combat Operations (RACO) - The Division Rear is responsible for contingency planning and direction of rear area security forces in the event of an enemy attack in the rear areas of the division. The division rear uses its own staff for both planning and direction of RACO. If the division Rear CP and the DISCOM headquarters are colocated, the division Rear will use the DISCOM headquarters staff in support of these functions.

Reconstitution Planning and Coordination - Again the Division Rear CP uses its staff for planning and coordination of reconstitution efforts for the

division. If colocated with the DISCOM HQ, the division Rear CP may use the DISCOM headquarters as support staff.

Communications - The Division Rear CP uses the DISCOM signal center for multichannel and RATT communications. In addition, it may use messengers and tactical radios.

Command and Control - The Division Rear CP makes the following decisions in the process of planning and directing both RACO and reconstitution efforts:

- Rear area combat operations contingency plans are developed which include resource allocation to the force designated by the division OPORD as the rear area security force.
- Reconstitution directives are formulated which include requests to the Combat Service Support functional area (DISCOM HQ), and corps Rear CP for personnel and major end item replacement.

The following considerations are taken into account:

- The division commander's guidance
- Action unit non-critical status reports and operations plans from the division Main CP
- Reported intelligence, weather, terrain from I/EW elements at division Main CP
- Status of the units to be reconstituted

The division Rear reports to the division Main the rear area security plan, situation reports on rear area combat operations, and the progress of ongoing reconstitution efforts to include the readiness posture of units being reconstituted.

1.2.2.1.4 The Cavalry Brigade (Air Attack) (CB(AA)).[27] The CB(AA) serves a similar function as the Corps Aviation Brigade at corps. It is a parent organization for division aviation assets of all types, including attack helicopters. When employed as a maneuver brigade, the CB(AA) can be represented with command and control relationships paralleling those found in Section 1.2.3 for the maneuver brigade. When the attack helicopter battalions

are controlled directly by the division main or Tac CPs, however, the CB(AA) can become an intermediate command and control headquarters. It is represented below as a control unit.

1.2.2.2 Divisional Action Units

1.2.2.2.1 Divisional Attack Helicopter Battalion(s). The divisional attack helicopter units are identical in makeup and operation to those at corps echelon. Because the corps uses the Main as the principal focal point for battle direction and for planning, command and control of these units at the corps level is a function of the Main CP. At division, planning is done at the Main CP and the Tactical CP handles immediate battle direction. Accordingly, the command and control links to the divisional Attack Helicopter Battalion(s) are also divided between the Main and Tactical CPs, with the CB(AA) augmenting both planning and direction functions. Since there are no other substantive changes from the corps units descriptions, the divisional Attack Helicopter Battalion(s) are not explicitly detailed here.

1.2.2.2.2 Divisional Cavalry Squadrons

Reconnaissance/Surveillance - The divisional R/S assets are consolidated into the integrated air and ground Cavalry Squadrons in the CB(AA). In the execution of R/S, these squadrons use organic observation and attack helicopters, cavalry fighting vehicles or scout cars, both aviation and ground vehicle fuel, and tactical radios. R/S efforts are initiated by both planned and unplanned mission tasking from the CB(AA).

The Cavalry Squadrons report mission status, enemy status, action unit status, NBC conditions and obstacles encountered to the CB(AA) and the division Tactical CP. Administrative and logistical reports are sent to the division Main CP.

Shooting - The divisional Cavalry Squadrons use organic attack helicopters with anti-personnel and anti-armor weapons, cavalry fighting vehicles or scout cars, mortars, fuel and ammunition to engage the enemy when directed. Such engagements can be initiated by either preplanned or unplanned taskings from the CB(AA) CP, or in direct response to enemy fire. The squadrons report known enemy status, action unit status, POW's captured, and other information of relevance to the immediate battle (such as weather, terrain, etc.) to the CB(AA) CP. Administrative and logistic reports relevant to shooting are sent to the division Main CP through the CB(AA) CP.

1.2.3 Brigade Echelon

1.2.3.1 Brigade Control Units

1.2.3.1.1 The Brigade Main Command Post

Battle Planning/Direction/Situation Assessment - The Brigade Main CP is the principal command and control node for the brigade echelon. It relies on its own staff to do battle planning, and direction and situation assessment in support of the near-term battle.

Communications - The brigade Main CP relies on the Forward Area Signal Center (FASC) in the brigade rear area for satellite, multichannel and RATT communications support. Messengers and tactical radios are also used extensively.

Command and Control - In the planning for the near-term battle and direction of the immediate battle, the brigade Main CP makes the following range of decisions:

- Action unit (battalion), ADA and combat support element positioning for the immediate battle
- Resource allocation in support of the immediate battle (to brigade action units)
- Task organization of brigade action units for anticipated operations

The following are considerations of use in making the decisions above:

- Brigade commander's guidance
- Mission tasking (from Div Main and Tac CP's)
- Action unit status (from battalion TOC's)
- Requests for support (from action units)
- Intelligence reported (by corps/division main CP I/EW elements)
- Combat information reported (by battalion action units)

The brigade Main CP sends the following information to higher headquarters as information feedback:

- Requests for immediate support (to division Tac CP)
- Combat information of immediate nature (to division Tac CP)
- Action unit critical status reports (to division Tac CP)
- Proposed operations plans (to division main CP)

1.2.3.2 Brigade Action Units

1.2.3.2.1 The Maneuver Battalions.[27] There are five types of maneuver battalions applicable to a corps/division level model. They are:

- Infantry
- Mechanized Infantry
- Tank
- Air Assault Infantry
- Airborne Infantry
- Attack Helicopter (OPCON from Division/Corps)

They are all similar in operation, the major differences being in the assets involved in each use.

Shooting - In engaging the enemy, Infantry, Mechanized Infantry, Air Assault, and Airborne Infantry battalions use:

- Anti-armor weapons
- Anti-personnel weapons
- Mortars
- Ammunition
- Ground surveillance radars

Tank and Attack Helicopter battalions use:

- Anti-armor weapons (tanks and attack helicopters)
- Anti-personnel weapons (tanks, APC's, and attack helicopters)
- Ammunition

Maneuver battalions engage the enemy on order from the brigade Main CP, or in response to enemy contact. They report the battle situation to the brigade Main CP, including:

- Known enemy status
- Action unit status
- NBC conditions encountered
- POW's captured

Movement - In moving, Infantry battalions use jeeps and trucks. Mechanized battalions have in addition, armored personnel carriers (APC's) and recovery vehicles. Tank battalions have APC's, main battle tanks, jeeps, trucks, recovery vehicles and bridging vehicles. Air assault battalions have jeeps and light trucks, as they rely on helicopter lift for major movements. Airborne battalions have no organic assets for movement, and thus rely on assets from the air force for movement. Attack helicopter battalions use attack, scout, and utility helicopters, jeeps and trucks for movements.

Air Assault and Airborne battalions rely heavily on the availability of landing and drop zones for movement. When they are being transported, and during delivery, these forces are fragmented and as a result are especially vulnerable. They cannot be used to engage the enemy until sufficient forces are massed in the landing areas to serve as a fighting unit. Air Assault battalions depend on the availability of lift helicopters from the combat support functional area while Airborne battalions depend upon the capability of USAF transport for airborne insertions.

Movement of a battalion is initiated either by a mission tasking (either OPORDs or FRAGORDs) from the brigade Main CP, or in a defensive response to taking enemy fire. The information feedback to the brigade Main CP as a result includes the coordination of checkpoints and routes, the new unit location and time of arrival, action unit status upon arrival, enemy information gathered during movement, NBC conditions and/or obstacles encountered during the move.

2.0 COMBAT SUPPORT SUBFUNCTIONAL AREA REPRESENTATION OBJECTIVES

Figure III-2 shows the combat support units considered in this paper. At each echelon, the principal control units are located at the main command posts. At corps, these include both the engineer and aviation sections. There are two intermediate headquarters at corps, the Engineer Brigade and the Corps Aviation Brigade, shown as dashed boxes. The Atomic Demolition Munitions (ADM) Company at corps is a special company capable of using tactical nuclear weapons for countermobility operations. The use of the ADM teams at division, as shown in the figure, is a force level decision of the corps commander, and the munitions are tightly controlled by the corps and division commanders.

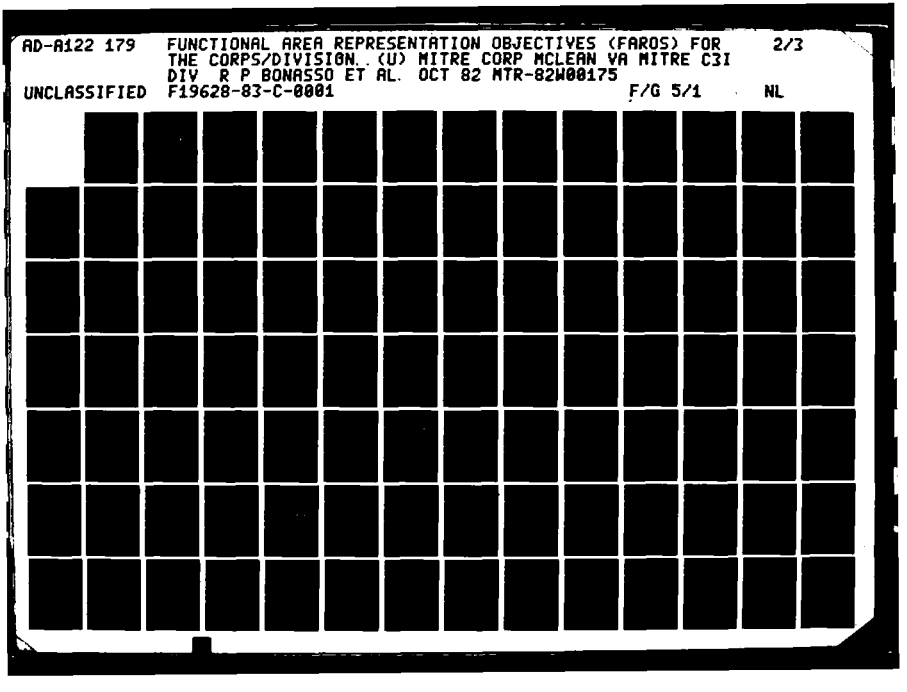
At division, the same separation between engineer and aviation support exists in the division main CP, with the two intermediate headquarters of the divisional Engineer Combat Battalion and the CB(AA). Engineer assets passed down from corps join the divisional assets under the Engineer Combat Battalion's control. That control is exercised from the Main CP through the engineer battalion. Aviation lift companies at division may be augmented from corps assets as well.

At brigade, there are only a few combat support assets available for direct brigade control. The aviation lift company is assigned from either the Corps Aviation Group (as an Assault Helicopter Company) or the division CB(AA) (as a Combat Support Aviation Company) on a direct support basis. The Engineer Combat Company is habitually assigned from division to the brigades and is controlled by the brigade engineer at the main CP.

2.1 Effects

The following sections describe five major categories of effects which are either caused by or which impact on the execution of a particular capability. As stated above, the capabilities examined are:

- Combat support planning/direction
- Air mobility support (aviation)
- Engineer mobility/countermobility support
- Engineer general engineering support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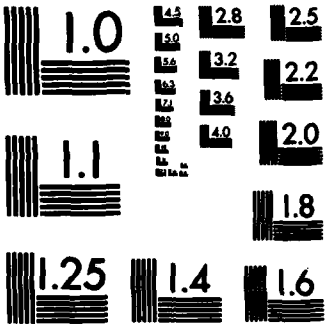

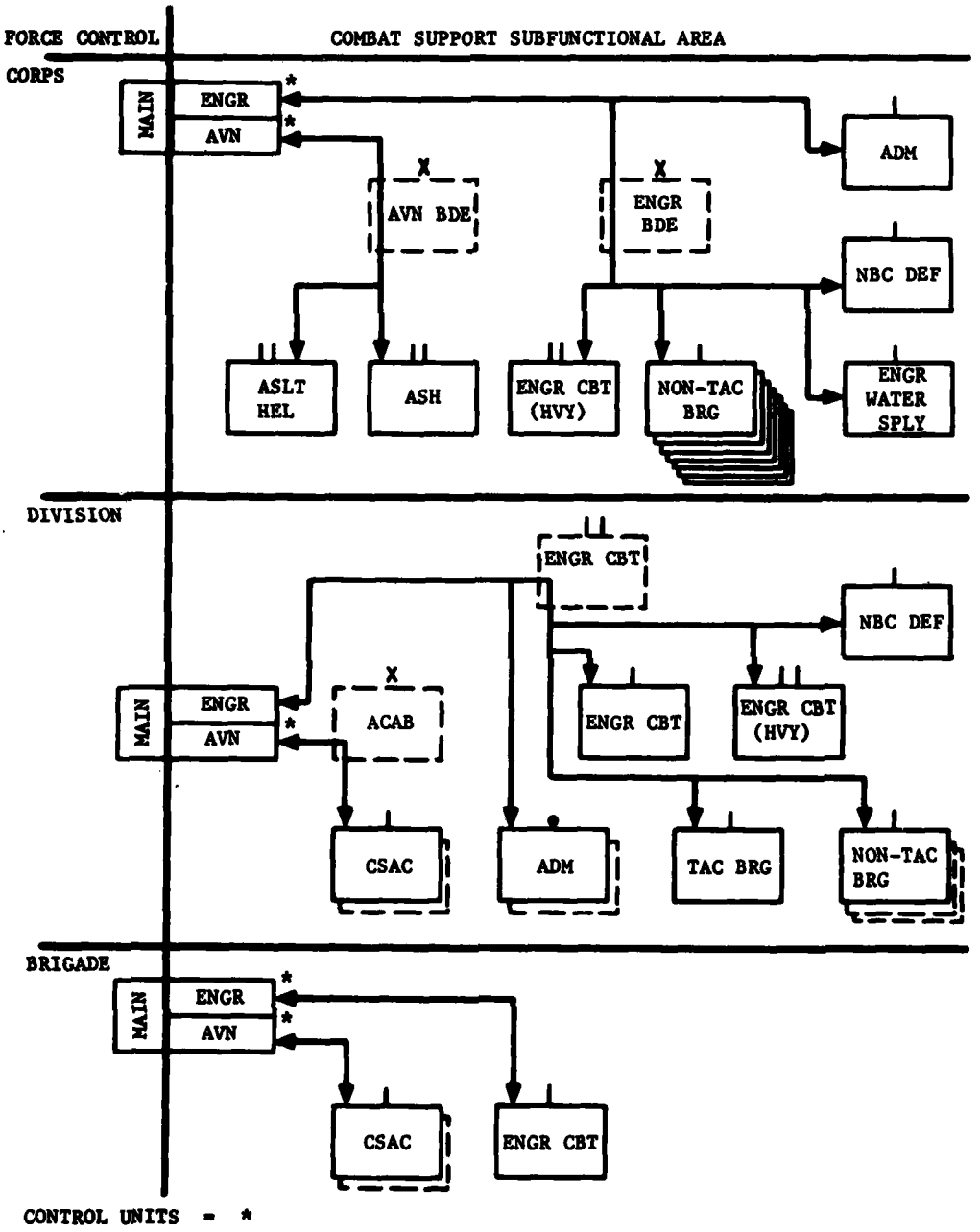

FIGURE III-2
COMBAT SUPPORT SUBFUNCTIONAL AREA

- Engineer survivability support
- Movement
- Communications

2.1.1 Effects of Executing the Capability on Targets, the Environment, and Assets

2.1.1.1 Combat Support Planning and Direction. There are no immediate effects on the battlefield from the performance of these functions, though their execution has indirect effects through the action units.

2.1.1.2 Airmobility Support. The principal results of airmobility support are the displacement of ground maneuver and field artillery units from one location to another. Fuel is consumed by the aircraft involved.

2.1.1.3 Engineer Mobility/Countermobility Support. In this category, roads and bridges are constructed, repaired or destroyed. Obstacles of all types (mines, abatis, craters, rubble) are created, emplaced, maintained, or removed. Both fuel and bulk (construction/materiel) supplies are consumed at a high rate for tactical engineer support of this kind.

2.1.1.4 General Engineering Support. Airfields and major complexes are built, repaired, maintained, improved, or destroyed according to the requirements of the battle. Roads and bridges are improved (and minefield lanes are widened). There is no direct effect on the enemy. Fuel and bulk supplies are consumed in these operations.

2.1.1.5 Survivability Support. This capability effects the battlefield by improving friendly units ability to fight through decontamination, providing a supply of potable water (and building defensive positions for fighting elements). Fuel for power is consumed in these functions.

2.1.1.6 Movement. (Roads and bridges are damaged due to the movement and use of heavy (especially tracked) engineer equipment.) Again, fuel is consumed in order to move.

2.1.1.7 Communications. There are no direct battlefield effects of communications, except the consumption of fuel to power communications equipment.

2.1.2 Combat Effects on the Capability

2.1.2.1 Combat Support Planning/Direction. Control units can be damaged or destroyed by enemy conventional attacks including direct support and interdiction air attack, indirect fire, direct ground fire and jamming of communications equipment. The enemy can also disrupt or deny planning and direction of combat support with nuclear attacks which cause blast, fires and radiation contamination of both personnel and equipment. Nuclear radiation and/or chemical attacks will cause short and long term personnel sickness, if not death. An indirect effect is the degradation of performance caused by the imposition of protective gear use either in anticipation of or in response to nuclear/chemical attack. [TREE and EMP will severely degrade electronic equipment used in these functions.]

2.1.2.2 Airmobility Support. Enemy conventional attacks from direct support or interdiction aircraft, air defense weapons, or indirect fire can delay, deny or destroy airmobile support aircraft, and the transported friendly unit. Unconventional attacks incur the same basic effects as above (blast, thermal, radiation, protective gear employment). [Both TREE and EMP will severely degrade aircraft performance due to the high reliability on electronic navigation, flight and communications equipment.]

2.1.2.3 Engineer Mobility/Countermobility Support. Enemy conventional attacks (from direct support or interdiction aircraft, indirect fire, direct ground fire, and jamming) can delay, deny, or destroy engineer elements involved in mobility or countermobility operations. Enemy nuclear attacks cause the same basic effects to this function as to any other: blast, thermal and radiation effects on personnel and equipment. [Protective gear employment severely degrades engineer performance.]

2.1.2.4 General Engineering. Same as 2.1.2.3 above.

2.1.2.5 Survivability Support. Same as 2.1.2.3 above.

2.1.2.6 Movement. Enemy direct support or interdiction aircraft can attack moving combat support elements. Aircraft are particularly vulnerable to air defense fires. In the nuclear and chemical arenas, blast, thermal, [and radiation contamination] effects severely degrade a unit's ability to move, [and the use of protective garments will further impede movement].

2.1.2.7 Communications. Radiating communications equipment is subject to detection, jamming, direction finding and targeting by the enemy.

Communicating elements are subject to all types of conventional attack. [In the nuclear/chemical environment, TREE and EMP will severely degrade if not destroy communications equipment.] Contaminated communications equipment requires special care to decontaminate without further damaging the internal components. [The use of protective garments will degrade responsiveness and intelligibility in communications.

2.1.3 Environmental Effects on the Capability

2.1.3.1 Combat Support Planning/Direction. There are no environmental effects of note for the control functions in combat support.

2.1.3.2 Airmobility Support. Adverse weather can delay, deny or disrupt flight. In some cases, adverse weather can enhance flight where helicopters rely on ground effect (frozen marsh areas).

2.1.3.3 Engineer Mobility/Countermobility Support. Difficult terrain can delay or deny construction or demolition efforts. Adverse weather will also degrade engineer performance in these areas.

2.1.3.4 General Engineering. Refer to 2.1.3.3.

2.1.3.5 Survivability Support. Refer to 2.1.3.3.

2.1.3.6 Movement. Adverse weather can delay or disrupt both ground and aerial movement. In some cases, weather can enhance movement, for example, heavy vehicles moving over frozen ground.

2.1.3.7 Communications. Communications signals are subject to (atmospheric attenuation and/or) terrain masking.

2.1.4 Situational Factors

2.1.4.1 Combat Support Planning/Direction. Control units which perform these functions must suspend operations when the command post they share displaces. Communications is particularly limited at the higher echelons (division, corps) when moving.

2.1.4.2 Airmobility Support. The status of the aircraft used in the lift, both from a maintenance and fuel point of view, determines the responsiveness of a particular unit. [Pilot availability is also an important status related factor, especially during sustained operations.] Aviation lift units cannot be

dynamically re-tasked in the middle of a mission without incuring a substantial time delay to regroup for the new mission.

2.1.4.3 Engineer Mobility/Countermobility Support. The status of special heavy construction equipment, in regard to both maintenance and fuel, determines a unit's availability for a mission. [Operator availability is also a factor for sustained operations.] Because engineers work in sections, or teams, and are often spread out over large areas in the performance of their functions, re-tasking of working elements will require a substantial delay for regrouping, especially if the unit is to be reconfigured for a different type of function (i.e., from breaching a minefield to road repair).

2.1.4.4 General Engineering. Refer to 2.1.4.3.

2.1.4.5 Survivability Support. Refer to 2.1.4.3.

2.1.4.6 Movement. Moving engineer or aviation units cannot perform their primary function of providing combat support to maneuver forces while they move, because working vehicles will be required to carry support equipment for the unit during the move. A unit must complete its move, then unpack its vehicles before operations can resume. Unit vehicles may need to refuel prior to starting a new mission.

2.1.4.7 Communications. Tactical radio nets can be congested and delay communications if too many users are on the system.

2.1.5 Effects from Other Functional Areas

2.1.5.1 Combat Support Planning/Direction. There are no major restrictions caused by a lack of other functional area support to the combat support control functions.

2.1.5.2 Airmobility Support. The lack of non-organic maintenance support and fuel supply from the combat service support (CSS) functional area will severely limit sustained aviation operations. [Supply of trained pilots is also dependent on the CSS segment.]

2.1.5.3 Engineer Mobility/Countermobility Support. Combat engineer operations depend heavily on non-organic maintenance support, fuel supply and construction materials supply from the CSS functional area.

2.1.5.4 General Engineering. Refer to section 2.1.5.3.

2.1.5.5 Survivability Support. Decontamination efforts require large amounts of decontaminated water to wash irradiated particles from personnel and/or equipment. While water supply is currently an engineer function at the corps echelon, divisional water supply depends on DISCOM in the CSS area.

2.1.5.6 Movement. Movement of combat support units requires fuel supply from the CSS functional area.

2.1.5.7 Communications. Combat support units use their organic tactical radios for the bulk of their communications needs. Access to satellite, multichannel and RATT equipment as needed will depend on access to those signal centers belonging to the control units in the combat subfunctional area of maneuver control.

2.2 Functional Representation

The following sections detail the execution of combat support by the major control and action units at each echelon.

2.2.1 Corps Echelon

2.2.1.1 Corps Control Units

2.2.1.1.1 The Corps Main CP Engineer Section

Engineer Combat Support Planning and Direction - The Corps Main CP Engineer Section provides the corps commander and operations staff with engineer related planning and direction.[32] The assets used are the personnel in the section.

Communications - The Corps Main CP Engineer Section has access to messengers, tactical radios, and the Corps Main CP Signal Center, which provides multichannel, satellite, and RATT communications support.

Command and Control - The Corps Main CP Engineer Section makes the following range of decisions:

- Task organization of engineer support to corps
- Resource allocation of engineer assets/units to division control on a direct support (DS) basis
- Mission tasking to corps engineer units

In making these decisions, the corps Main CP engineer section considers the following:

- Corps commander's guidance
- Corps operational plans/orders both current and future (from corps G3)
- Requests for engineer support (from division main CP's and/or corps rear elements)
- Engineer action units status (from corps engineer action units).

The Corps Main CP Engineer Section makes requests to engineer organizations at echelons above corps (EAC) for further engineer support not available within the corps area.

2.2.1.1.2 The Engineer Brigade. The Engineer Brigade at corps is considered in this paper as an intermediate headquarters because it has the role of a parent unit. It provides organic maintenance, supply and administration for the engineer units in its charge, but has no real tactical command and control activity. For these reasons, it is represented as C^2 asset of the Corps Engineer Section.

2.2.1.1.3 The Corps Main CP Aviation Section

Aviation Support Planning/Direction - The Corps Main CP Aviation Section uses its own staff personnel to conduct aviation planning and coordination in support of the corps echelon.[32]

Communications - The aviation section of the Corps Main CP uses the Corps Main CP Signal Center, an asset of the maneuver control functional area. In addition it uses messenger and tactical radios.

Command and Control - The Corps Main CP Aviation Section makes the following range of decisions:

- Task organization of corps level aviation support
- Resource allocation of corps aviation units/assets to division control on a direct support (DS) basis
- Mission tasking to corps aviation units

The Corps Main CP Aviation Section considers the following in making these decisions:

- Corps commander's guidance
- Corps operational plans and orders current/future (from corps main CP)
- Aviation action units status (from corps aviation action units)
- Requests for future aviation support (from corps action units)

Corps Main CP Aviation Section will send requests for additional support to EAC aviation organizations.

2.2.1.1.4 The Corps Aviation Brigade. The Aviation Brigade found at the corps echelon is a parent organization for both combat, combat support and combat service support aviation units. It performs command and control functions in response to specific tasking from the Corps Main CP. Tasking of and reporting from corps combat support aviation units flow through the Aviation Brigade, which for the purposes of the corps/division level model is transparent. For these reasons, it is considered as a C^2 asset of the Aviation Section.

2.2.1.2 Corps Action Units

2.2.1.2.1 Assault Helicopter Battalion

Transport Small/Medium Tactical Units - The Assault Helicopter Battalion uses utility helicopters, aviation fuel, tactical radios, and pilots. An airmobile lift is triggered by mission tasking from the Corps Main CP (Aviation Section) via the Aviation Brigade. Upon receipt of the tasking, the battalion passes the following information to the Corps Main CP:

- Route and checkpoint coordination
- Mission status
- Action unit status report
- Combat information gathered during the mission

2.2.1.2.2 Assault Support Helicopter Battalion (ASHB)

Transport Medium/Large Tactical Units - The ASHB uses medium cargo helicopters, utility helicopters, tactical radios, aviation fuel and pilots to transport larger tactical units. When used in a combat support role this unit will operate in conjunction with the Assault Helicopter Battalion for an airmobile mission. Artillery batteries can also be transported by this unit.

Mission tasking and reporting is identical to that for the Assault Helicopter Battalion.

2.2.1.2.3 Engineer Combat Battalion (Heavy)

General Engineering - This corps engineer battalion uses heavy earthmoving equipment, mine detectors, supporting tractors and trucks, bulk engineering supplies, tactical radios and fuel to do general engineering tasks at the corps echelon. This includes road/bridge repair [and improvement, widening minefield lanes], airfield construction [and repair, and command post support].

Mission tasking comes from the Corps Main CP Engineer Section via the Engineer Brigade. The information reported to the Engineer Section as a result includes:

- Mission status
- Action unit status report
- Information gathered during the mission

[2.2.1.2.4 Non-Tactical Bridge Companies

Emplace/Remove Non-Tactical Bridges - There are a number of different bridging companies at the corps echelon each with a different type of bridge set. In general, however, these companies use bridge laying trucks or cranes, bridges, earthmoving equipment and supporting trucks, fuel and tactical radios to emplace or remove bridges. This capability does not include a capability to operate in the forward areas, as this equipment is not armored.

Mission tasking and reporting parallels those discussed above for the Engineer Combat Battalion (Heavy), section 2.2.1.2.3.]

2.2.1.2.5 Atomic Demolition Company (ADM)

Emplace/Remove ADMs to Create Mobility Restrictions for Enemy Forces - ADM companies at Corps have atomic demolition teams, atomic munitions and tactical radios as their primary assets. A particular note concerning the need for other functional area support is that the ADM teams do not normally carry the munitions with them until after nuclear release is in effect. Upon receipt of the nuclear release, the ADM teams depend on aviation or truck transport from the combat support or combat service support functional areas for delivery of the munitions to the forward areas where the teams operate.

Mission tasking comes directly from the Corps Main CP, as does nuclear release when it is approved. Information feedback from the ADM company is sent directly to the Corps Main CP including:

- Mission status (and nuclear fire confirmation)
- Action unit status report (including munition status)
- Information gathered during the mission (NBC reports on contaminated areas)

2.2.1.2.6 NBC Defense Company

Nuclear/Biological/Chemical Reconnaissance - The NBC Defense Company provides NBC recon to the maneuver forces at corps to bound areas of contamination. The assets used are the NBC defense platoons, chemical agent/radiation detection equipment, jeeps, fuel and tactical radios.

Mission tasking comes from the Corps Main CP Engineer Section via the Engineer Brigade. The NBC Defense Company reports NBC reconnaissance results and unit status reports back through the Engineer Brigade to the Corps Main CP Engineer Section as a result.

Personnel Decontamination - The NBC Defense Company uses the NBC defense platoons, decontamination equipment, supporting trucks, water tankers and pumps, fuel and tactical radios to provide personnel decontamination points in the corps area. In the process, an effect of performing this capability is the contamination of the area of operation, since decontamination efforts require the spraying of water, which once contaminated must drain somewhere. This unit also has a high dependency on a water supply

source provided by the corps Engineer Water Supply Company (to be discussed below).

Mission tasking includes directives to establish personnel decontamination stations, and it comes from the Corps Main CP Engineer Section via the Engineer Brigade. The NBC Defense Company reports along the same channels the following information feedback:

- Mission status
- Action unit status
- NBC reports

2.2.1.2.7 Engineer Water Supply Company

Potable Water Reconnaissance/Purification/Supply - The Corps Engineer Water Supply Company uses water purification and decontamination equipment, water storage tanks, pumps and tank trucks, water supply and water distribution platoons, fuel and tactical radios in their mission to find, clean and supply potable water in the corps area.

Mission tasking comes from the Corps Main CP Engineer Section via the Engineer Brigade. The information feedback includes the action unit status reports, NBC reports, the location of water supply points, the volume of water available, and [the rate of flow available at each supply point].

2.2.2 Division Echelon

2.2.2.1 Divisional Control Units

2.2.2.1.1 The Division Main Command Post Engineer Section

Engineer Support Planning/Direction - The Division Main CP Engineer Section uses its staff and the Eng CBT BN HQS to do planning and tasking for engineer support to the division.[32]

Communications - The division Main CP Engineer Section uses the communications facilities of the Main CP, (which belong to the maneuver control functional area). In addition, messengers and tactical radios may be used.

Command and Control - The division Main CP Engineer Section is involved in the following decisions:

- Resource allocation of divisional engineer action units among brigades
- Requests for additional engineer support to Corps Main CP Engineer Section
- Mission tasking for divisional engineer units

The following considerations are pertinent during the decision process:

- Division commander's guidance
- Corps/division current/future operations orders and plans (from division main CP)
- Corps engineer units available to division and their status (from corps engineer action units at division)
- Divisional engineer action unit status reports
- Requests for engineer support (from division and brigade level action units)

This unit sends requests for additional engineer support either to corps or EAC echelons.

2.2.2.1.2 The Engineer Combat Battalion HQ. The divisional Engineer Combat Battalion HQ is considered an intermediate headquarters for divisional control of engineer efforts in the corps/division level modeling effort. It is represented as a C^2 asset of the Engineer Section. The line companies and bridge company found in this battalion are separately detailed as action units in the following sections.

2.2.2.1.3 The Division Main Command Post Aviation Section

Aviation Support Planning/Direction - The Division Main CP Aviation Section has parallel responsibilities to those at corps. The assets used are the staff and the CB(AA).[27] Aviation support planning and tasking is done in response to the general division requirements for aviation combat support.[32]

Communications - This Main CP section relies on the Main CP Signal Center which belongs to maneuver control for multichannel, satellite and RATT support. Organic messengers and tactical radios may also be used.

Command and Control - The division Main CP Aviation Section makes the following range of decisions:

- Task organization of divisional aviation support elements
- Resource allocation of divisions aviation elements to brigades
- Mission tasking to divisional aviation assets (through the intermediate headquarters, the CB(AA)).

The following considerations are used:

- Division commander's guidance
- Division operational plans current/future (from division main CP)
- Aviation action units status (from division aviation action units)
- Requests for future aviation support (from division action units)

Requests for additional aviation support will be sent to the Corps Main CP Aviation Section for its consideration and review.

2.2.2.1.4 The Cavalry Brigade (Air Attack) (CB(AA)). The CB(AA) is an organization which aggregates divisional aviation assets from all functional areas to form a parent organization. While the CB(AA) is also being considered as a separate maneuver brigade divisional aviation combat support will be directed at the division main and tactical command posts utilizing the CB(AA) as an intermediate control asset. It is therefore represented as a C^2 asset of the division Main CP Aviation Section.

2.2.2.2 Divisional Action Units

2.2.2.2.1 Combat Support Aviation Company (CSAC)

Transport Small/Medium Tactical Units - The CSAC uses utility helicopters, aviation fuel, tactical radios and pilots to air lift small and medium sized tactical units when used in a combat support role. Its combat service support role is covered in the CSS FARO. An airmobile lift is initiated by

mission tasking from the division Main CP Aviation Secton via the Cavalry Brigade (Air Attack) (CB(AA)).

The CSAC sends route and checkpoint coordination reports, mission status, action unit status and combat information gathered as a result of operating in the forward area.

2.2.2.2.2 Engineer Combat Battalion (Heavy) (DS). This corps level asset has already been detailed above (section 2.2.1.2.3). This battalion can be assigned on a direct support basis to a division, in which case it is controlled by the division Main CP Engineer Section.

2.2.2.2.3 Non-Tactical Bridge Company (DS). In a similar fashion, non-tactical bridging companies can be assigned from corps to division on a direct support basis. The control link would then be transferred to the division Main CP Engineer Section. Refer to section 2.2.1.2.4 for a description of these units.

2.2.2.2.4 Atomic Demolition Team(s). The corps may assign one or more ADM teams from the ADM Company down to the division on a direct support basis. In this case, control would be transferred to the division commander directly because of the nuclear munitions of this unit. Refer to section 2.2.1.2.5 for a description of the corps level asset.

2.2.2.2.5 Engineer Combat Company

Emplace/Remove Countermobility Obstacles (Mines/Abatis/Boobytraps/Craters/Etc.) - Typically a division will retain one of the four Engineer Combat Companies at division, while assigning the other three to the brigades. The assets used in these companies to emplace or remove countermobility obstacles are mine detectors and rollers, heavy earthmoving equipment, supporting trucks, scooploaders, chain saws, backhoes, mines, fuel, bulk materials, tactical radios, and the operational personnel.

Mission tasking comes from the division Main CP Engineer Section via the Engineer Combat Battalion HQ as an intermediate headquarters. Information feedback from the company to the Engineer Section includes mission status, action unit status, and information gathered during the mission.

General Engineering - This company uses heavy earthmoving equipment, fuel, personnel, bulk supplies, and tactical radios to do the many general engineering tasks required to support the division. Mission tasking and reporting follows the pattern found in the paragraph above on countermobility obstacles.

2.2.2.2.6 Tactical Bridge Company

Emplace/Remove Tactical Bridges - This company comes from the divisional Engineer Combat Battalion and it uses bridge sets, launchers, assault boats, personnel, fuel and tactical radios to emplace and/or remove bridges in the forward areas. This equipment is armored and can operate in a hostile environment (forward areas).

Mission tasking to support a particular maneuver unit comes from the division Main CP Engineer Section. Information feedback is sent back to includes the mission status, action unit status report, and any combat information gathered during the mission.

2.2.3 Brigade Echelon

2.2.3.1 Brigade Control Units

2.2.3.1.1 The Brigade Main Command Post Engineer Section

Engineer Support Planning/Direction - The brigade Main CP Engineer Section uses its staff as the principal asset for engineer support planning and direction.[32]

Communications - The brigade Main CP Engineer Section uses the brigade Main CP's Forward Area Signal Center for satellite, multichannel and RATT communications support. Messengers and tactical radios may also be used.

Command and Control - The brigade Main CP Engineer Section makes the following range of decisions:

- Resource allocation of engineer assets among the maneuver battalions
- Mission tasking of engineers to support the brigade scheme of maneuver

In making these decisions, the brigade Main CP Engineer Section uses the following:

- Brigade commander's guidance
- Current/future brigade/division opords and oplans (from brigade main CP)
- Immediate requests for engineer support (from battalion action units)
- Engineer action units status reports

Requests for additional engineer support are sent to the division Main CP Engineer Section for consideration and approval.

2.2.3.1.2 The Brigade Main Command Post Aviation Section

Aviation Support Planning/Direction - The brigade Main CP Aviation Section uses its small staff to do aviation support planning and direction in support of the brigade scheme of maneuver.

Communications - The brigade Main CP Aviation Section uses the brigade Main CP's Forward Area Signal Center (FASC) for satellite, multichannel and RATT communications support. Messengers and tactical radios may also be used.

Command and Control - The Aviation Section makes the following range of decisions:

- Resource allocation of direct support aviation assets from division or corps among the maneuver battalions
- Specific mission tasking/direction to aviation units operating in brigade area according to the brigade scheme of maneuver

The following considerations are used:

- Brigade commander's guidance
- Current/future division/brigade operations orders and plans (from brigade main CP)
- Immediate requests for aviation support (from battalion action units)
- Aviation action units status reports

Requests for additional aviation support are sent to the division Main CP Aviation Section for consideration and approval.

2.2.3.2 Brigade Action Units

2.2.3.2.1 Combat Support Aviation Company (CSAC). Refer to the CSAC at division for a detailed explanation. When a divisional CSAC is direct support to a brigade, the control linkages are transferred to the brigade Main CP Aviation Section.

2.2.3.2.2 Engineer Combat Company. Each brigade receives one of four engineer companies from the divisional Engineer Combat Battalion. Refer to the divisional company (section 3.2.2.2.5) for a detailed description of the company. The direct support company at brigade is controlled by the brigade Main CP Engineer Section in the same manner as at the division.

APPENDIX IV

I/EW FUNCTIONAL AREA REPRESENTATION OBJECTIVES

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(Concluded)

1.0 THE I/EW FUNCTIONAL AREA REPRESENTATION OBJECTIVES

Figure IV-1 represents those essential I/EW elements of concern to a corps/division level model. Actual unit names organizations are currently undergoing doctrinal review, so we have depicted the essential unit functions involved in the I/EW process.

This functional area representation combines several functions currently separate in field organizations in order to capture the essence of I/EW for a corps and division level model. The amount of detail required to accurately represent the current division of labor between the CEWI and G2 organizations is more the domain of a functional area model.

1.1 Effects

The following sections describe five major categories of effects either on or caused by the execution of the following seven capabilities:

- Collection mission management
- Jamming mission management
- Fusion management
- Collection (of all types)
- Jamming
- Fusion
- Movement or flying

1.1.1 Effects of Executing the Capability or Targets, the Environment, and Assets

This section deals with how the execution of a capability or function will have certain effects on the battlefield environment, to include the effects on the enemy, terrain, and friendly elements.

1.1.1.1 Collection/Jamming/Fusion Management. There are no direct effects involved in these areas on the battlefield environment.

1.1.1.2 Collection. The collection of intelligence will have no direct appreciable effect on the enemy, or terrain. The sensor systems will consume fuel during the collection effort, and the associated equipments will experience operational degradation.

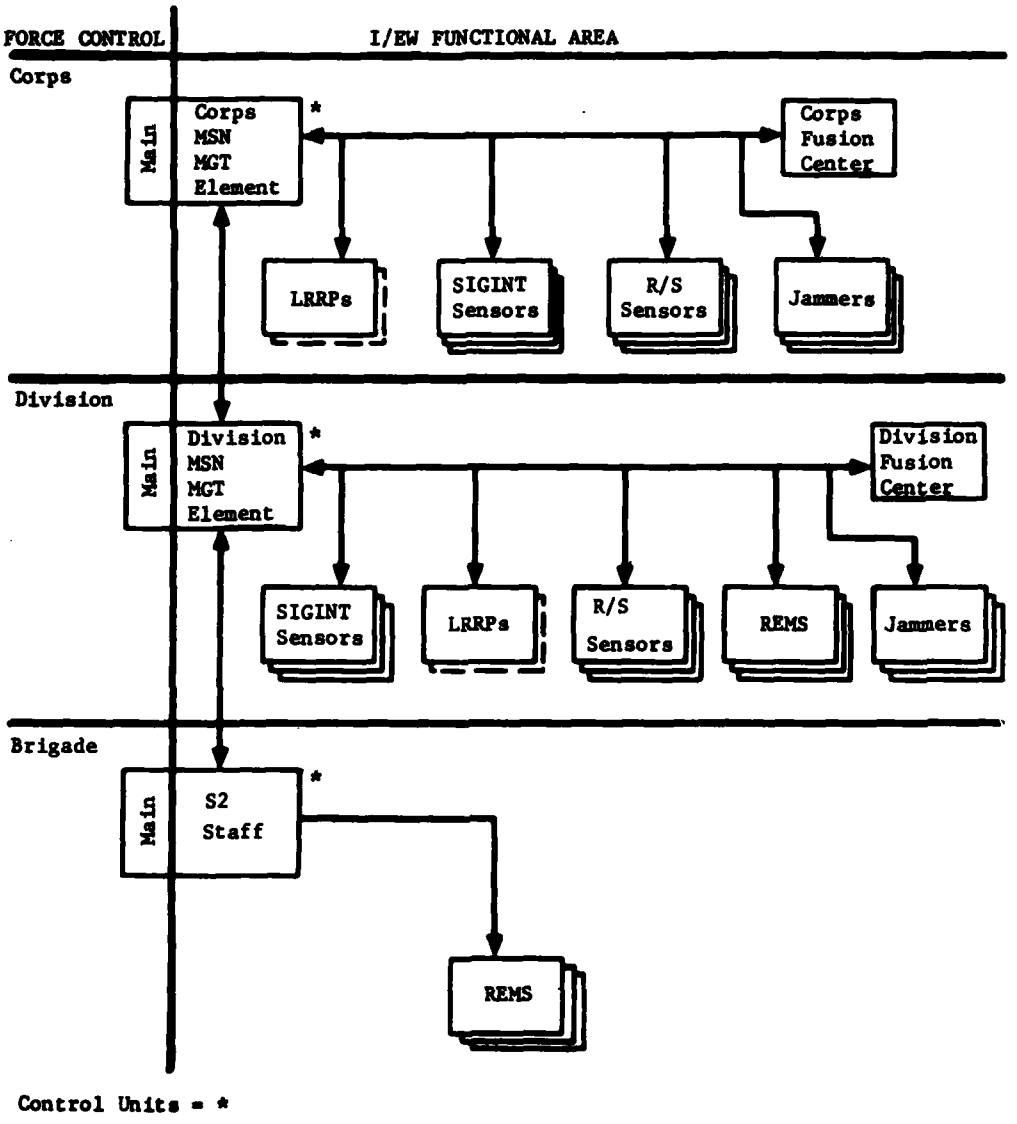

FIGURE IV-1
I/EW FUNCTIONAL AREA

1.1.1.3 Jamming. The major direct effect of jamming is the disruption of enemy communications and/or radar activity. Because jamming transmissions cannot distinguish receivers, except by frequency and modulation, the potential exists for the unintentional jamming of friendly electronic equipments within the range and frequency band of the jammer. Fuel is consumed both to power the jammer and the communications equipment involved.

1.1.1.4 Fusion. There is no direct effect of the fusion process on the battlefield environment.

1.1.1.5 Movement/Flying. The main battlefield effect of the movement of I/EW control and action units is the consumption of fuel used for powering vehicles and communications equipment.

1.1.2 Combat Effects on the Capability

This section describes the effects of enemy activity on the performance of the capability described.

1.1.2.1 Collection/Jamming/Fusion Management. The control of I/EW functions can be directly affected by enemy conventional and unconventional attacks. The enemy can attack (either with a jammer or anti-radiation guided weapons) the communications links vital to mission management. He can also attack the management center(s) through direct ground attack, interdiction strikes, and indirect fire. Nuclear and chemical effects will include blast, nuclear fires, [TREE and EMP (on the communications and computer equipment), radiation or chemical agent induced sickness] and the degradation of operations while in MOPP status.

1.1.2.2 Collection. Sensor systems are subject to direct attacks, close air support or interdiction air attacks, jamming and/or anti-radiation guided attacks on communications links, air defense or air to air attack for airborne systems, and indirect fire. The nuclear and chemical effects are the same as those noted above for the management functions.

1.1.2.3 Jamming. Jamming systems are subject to the same combat effects as collection systems.

1.1.2.4 Fusion. The multi-source analytical process is subject to the same combat effects as those for the management processes. A particular vulnerability exists in the form of the reliance on computers containing data bases and fusion algorithms to increase the speed of processing. [These computers are subject to TREE and EMP degradation.]

1.1.2.5 Movement/Flying. Moving I/EW collectors and jammers are subject to enemy attack in the form of indirect fire, direct support and interdiction aircraft attack, and air defense and air to air attack (for airborne systems). Nuclear and chemical effects are blast, nuclear fires, [TREE and EMP on electronic navigational and avionics equipment] and radiation and chemical agent induced sickness.

1.1.3 Environmental Effects on the Capability

This section deals with the direct effects of the environment, to include weather, terrain, natural obstacles, and nuclear/chemical obstacles.

1.1.3.1 Collection/Jamming/Fusion Management. Communications equipment used in the direction of collection, jamming and fusion can suffer from signal attenuation due to range, terrain and/or atmospheric considerations.

1.1.3.2 Collection. Collection by electronic equipment, to include both SIGINT sensors and radars, are affected by the signal attenuation noted above for communications gear. Sensor reports of all types depend on tactical radios or data links for transmission; those links are similarly affected. Imagery sensors are subject to battlefield obscuration and ground clutter or masking. The nuclear and chemical related effects include TREE and EMP on hardware components and signal attenuation due to nuclear and chemical clouds. Equipment contamination and/or the use of nuclear/chemical protective garments will degrade collection efforts.

1.1.3.3 Jamming. Jammers are subject to the same environmental effects noted above for sensors.

1.1.3.4 Fusion. Fusion centers are relatively immune to the environmental effects except that the communications equipment is subject to the same signal attenuation problems noted above. Computers used in the fusion process are also subject to voltage fluctuations caused by lightning.

1.1.3.5 Movement/Flying. Depending on the weather environment, movement by ground or air means can either be enhanced or degraded. Freezing temperatures will enable heavy vehicles to traverse areas not previously passable. Heavy rainfall will deny areas to ground travel. Airborne systems will be restricted by adverse visibility and weather conditions. Mobility restrictions caused by a nuclear/chemical environment include tree blowdown, fires, cratering, rubble and blast.

1.1.4 Situational Factors

This section deals with those status related factors which affect particular capabilities.

1.1.4.1 Collection/Jamming/Fusion Management. When control elements are required to move, the corps or division main CP's displace, and cannot continue to perform their principal missions of I/EW management. Utilization of a jump capability in which a portion of a control element moves while the other portion maintains position will reduce disruption. Communications with the sensors/jammers is temporarily disrupted, or limited, and the analytical direction is similarly disrupted by the movement of the fusion center.

1.1.4.2 Collection. The collection management and EW sections need to coordinate conflicts in which friendly jammers deny frequencies used for listening. Ground based systems cannot collect during movement. Aircraft availability directly affects the collection mission. [The availability of trained operators will determine the quality and responsiveness of collection missions.]

1.1.4.3 Jamming. See collection above.

1.1.4.4 Fusion. Analysis and synthesis of intelligence reports depends both on the actual volume of reports coming into the fusion center, and on the volume of reports processable by the center's assets. Too few reports restrict the validity of the conclusions made. Too many reports will swamp the analysts and delay conclusions and their reporting. The quality and responsiveness of the fusion process depends greatly on [the skill level and availability of both the fusion analysts and their supporting sensor/jammers analytical teams as well as] the quality and/or completeness of the reports received.

1.1.4.5 Movement/Flying. The positioning of sensors and jammers in response to a mission tasking will require route coordination, for the airborne systems. Current sensors and jammers cannot operate while moving.

1.1.5 Effects from Other Functional Areas

This section deals with the effects caused by the lack of support from another functional area on the ability to perform the capability.

1.1.5.1 Collection/Jamming/Fusion Management. Decontamination of personnel and equipment requires combat support (NBC Defense Company)

and/or combat service support (DISCOM) for supply of water, spraying equipment, and protective garments. The supply of fuel to power communications and computer systems is also dependent on the availability of POL.

1.1.5.2 Collection. Sensors require fuel decontamination support, and protective garments from the combat service support area.

1.1.5.3 Jamming. Jammers require similar CSS support to that required by collection systems.

1.1.5.4 Fusion. See 1.1.5.1.

1.1.5.5 Movement/Flying. I/EW movers and flyers require the same type of combat service support noted above for sensors.

1.2 Functional Representation

The following sections describe the execution of the capabilities essential to I/EW by the major I/EW elements. The major distinctions are by echelon, and within echelons by control and action units.

1.2.1 Corps Echelon

1.2.1.1 Corps Control Units

1.2.1.1.1 Corps Mission Management Element

Collection Mission Management - The assets involved in the management of the collection process at corps include the G2 Mission Management and Dissemination Section (MMDS) staff, the CEWI Group CTOC Support Element and Technical Control and Analytical Element (TCAE) staffs, including single source analytical teams and computers.[33] [There are no non-standard effects here except to highlight the vulnerability of the computers involved to nuclear TREE and EMP effects.] The loss of the detailed data bases which contain a history of the intelligence collection effort will disrupt any on-going effort.

Jamming Mission Management - The assets involved in the direction of jamming operations at corps include the CEWI Group EW support section and TCAE staffs, single source analytical teams for SIGINT and computers.

Fusion Direction - The assets involved in the direction of the multi-source analysis effort include the G2 MMDS staff and the computers used for

collection management. Vulnerabilities for computer data bases involved in the fusion effort are similar to those in collection management.

Communications - The assets used in the above functions for the purpose of communications include tactical radios, the corps multichannel signal center (an asset of the corps main command post), and messengers.

Movement - The corps mission management element will not move in the course of its normal operations. It will, however, displace with the corps main command post.

Command and Control - In the execution of collection mission management several decisions are made. Collection assets are allocated, positioned, and tasked to meet the general intelligence requirements, and sensor reports are evaluated to determine if there is any information of immediate use to the force commander. The consideration used in these decisions include the corps commander's essential elements of information (EEI) and other intelligence requirements (OIR), immediate collection requirements from the corps G2 in response to an immediate need of the commander, collection requests from the corps fusion center for additional information needed to support ongoing analyses, collection requests from the divisional mission management element, and the status reports which are sent in from the various collection action units (sensors). The feedback to higher headquarters for collection management includes the requests for collection tasking of echelons above corps (EAC) assets, to include USAF, national and allied reconnaissance/surveillance assets, and the dissemination of single-source combat intelligence to the corps G2 (for the corps commander).

For jamming mission management, the decisions made include the tasking of corps level jammers, and the evaluation of jamming end of mission reports to determine the presence of combat intelligence of immediate use to the force commander. In making these decisions, the corps jamming support requirements from the corps G3 are used along with the status, range and characteristics of the various corps level jammers and the collection tasking already processed in collection management. Reported SIGINT is also used for the direction of jamming operations. The feedback to higher headquarters consists of the passing of combat intelligence determined in the jamming and associated SIGINT reports (essentially single-source) to the corps G2.

Fusion management is the general direction of multi-source analytical efforts in response to the commander's need for intelligence. The decisions made include the determination of the type of information required, the time

window applicable, and the amount of assets needed to do the fusion job. Specific taskings will consist of requests for clarification of a report, or the requirement for a detailed investigation of a particular area of the battlefield. The considerations used are the commander's immediate requests for processed intelligence on a particular aspect of the enemy, the commander's overall guidance on the types of information he wants to receive as a matter of course (his EEI) the speed and intensity of the battle, and targeting requirements from the Corps Field Artillery Section of the corps headquarters.[25] Information feedback consists of the passing of intelligence summaries produced by the fusion center to the corps G2 and target intelligence to the corps FAS.

1.2.1.1.2 Intermediate Headquarters. Several intermediate headquarters exist at corps which are considered as C^2 assets in this representation. In the CEWI group at corps, there is the Tactical Exploitation Battalion, the parent unit for ground sensors and jammers. The Aerial Exploitation Battalion serves the same role for aerial sensors and jammers. Should long range reconnaissance patrols be tasked once again as an I/EW function, the parent unit would be the Ranger Battalion at corps. Parent units provide resupply, maintenance, and admin/log support for the functions being performed. While they keep detailed accounts of the systems locations and status, they are not specifically charged with developing tasking for individual missions.

1.2.1.2 Corps Action Units

1.2.1.2.1 Corps Fusion Center. (Currently the G2 All Source Production section.)

Multi-Source Analysis (Fusion) - This unit uses sensor reports of all types along with terrain and weather data to determine enemy location, strength, and intent. It uses its own staff and computer data bases to do detailed correlation and aggregation of the reported data. While the standard effects apply, including the high vulnerability of the process to computer damage, the staff involved is very highly skilled and difficult to replace if wounded or killed through enemy action. Should the corps fusion center be degraded more than 50% for more than 8 hours, the EAC fusion center will establish direct channels with the division fusion centers in the corps fusion center's place.[25] The fusion process is an on-going one, officially begun when the corps commander specifies his EEI, and continued by the commander's requests for information as the battle progresses. During the fusion process, answering one question may generate another, thus creating an internal form of tasking as well.

The conclusions derived from the multi-source analysis are reported to the corps mission management element for dissemination to the force commanders involved (corps, division and/or brigade). Target development information is also reported to the corps mission management element for transmission to the corps FAS for targeting, although some sensors have direct QUICKFIRE channel to the FAS for targeting that will circumvent the mission management element.[25]

Movement - The corps fusion center will not move in the normal course of its operation. It will displace, however, with the corps main command post, and operate at a degraded level during the movement.

1.2.1.2.2 Long Range Reconnaissance Patrols (LRRPs)

Reconnaissance/Surveillance - While the long range reconnaissance mission has no current doctrinal execution, its contribution to the quality of the enemy situation assessment produced by the intelligence functional areas is of enough significance to warrant explicit modeling at the corps and division levels. Long range patrols sent behind the front line of troops (FLOT) to report on the enemy's second echelon elements and flanks use tactical radios for the reporting of intelligence gathered. Because of their deep employment, they are vulnerable to capture and compromise. Since LRRP reports are difficult to communicate back to the corps mission management elements due to the ranges involved there is an accentuated need for secrecy to avoid disclosure. Communications relays may be required. LRRP reports include not only enemy situation reports, but action unit status reports and coordination of recovery means.

Movement - LRRPs can either be airlifted into position or can move on foot into the area. They also can be left behind in a retrograde movement. They have no vehicles for movement. Once employed, they may relocate from time to time in their reconnaissance effort within a predetermined area which has been coordinated with the corps FAS and designated a restricted fire area. Movement and location will not be reported until coordination of recovery is required.

1.2.1.2.3 SIGINT Sensors

Signals Intelligence Collection - In the collection of signals intelligence the assets involved consist of both ground based and airborne COMINT and ELINT sensors, ground processing stations, operators, and the tactical radios by which tasking is received and reports are sent back to the control unit.

SIGINT collection missions come from the corps mission management element to a particular sensor for execution. In many cases, the sensor will have to relocate prior to starting the mission. Sensor reports are prepared by the operator and transmitted by tactical radios to the processing center. For airborne systems, the data is downlinked via secure tactical radios or digital transmissions, to the ground processing station, and the data is forwarded to the mission management element as formatted sensor reports for inclusion into the fusion process, or sent directly to the fusion center without processing. Some SIGINT reports will trigger an immediate attack mission, via either a QUICKFIRE channel to the FAS or a dedicated link to a jammer, depending on the mission tasking.[25] The sensor system status and location is reported to the mission management element.

Movement - For movement, ground based systems are mounted on trucks or APCs and airborne systems use either fixed wing or rotary wing aircraft. Other assets include the tactical radios used to direct movement, the fuel required to move, and the crew required to assemble or disassemble the ground based equipment and/or required to fly the aircraft.

SIGINT sensors can move in response to a mission tasking that requires repositioning, because of a self-determined need to better locate itself for collection, or from a predetermined flight route (airborne systems). The enemy can also induce movement of a SIGINT sensor by indirect fire attacks, direct attacks, or air to ground attacks for ground systems, or air defense and/or air to air attacks for airborne systems. In addition, airborne systems have an on-station time restriction associated with the consumption of aircraft fuel.

In response to a movement, SIGINT sensors will report the cause for changing position, the new location and expected time of arrival and the ready status. These reports are sent to the mission management element through the parent battalions of the sensors.

1.2.1.2.4 Reconnaissance/Surveillance Sensors

Reconnaissance/Surveillance - The capability for reconnaissance and surveillance at the corps level is provided by side looking airborne radars (SLAR), and airborne imagery collectors. The assets involved include the aircraft, the on-board collection systems, crew, aircraft fuel, sensor operators, ground processing stations and their operators, and the tactical radios used in mission tasking and reporting. R/S missions are processed in a similar manner as to the SIGINT missions noted in the previous section except that

the aircraft must be configured prior to flight for a particular type of R/S sensor, and cannot be reconfigured in flight.

Movement - R/S aircraft movement is dependent on the aircraft, crew, and fuel available. Of particular note is the limitation on the mission duration imposed by the aircraft performance and fuel availability. Movement is caused by the same triggering events as those for airborne SIGINT collection, i.e., mission tasking, a self-determined need for relocation, or enemy attack. The information reported is again the cause for movement, the new location and the mission ready status.

1.2.1.2.5 Corps Level Jammers

Jamming - In the jamming of enemy communications and radar frequencies, the jammers under corps direction are currently ground-based. The assets used are the jammer itself, the jammer operator(s), and tactical radios used to receive direction and to report results.

Jamming missions originate from the corps mission management element, and from the division mission management element when located in the division area of operations. The action unit (the jammer) reports both the mission status, and its own status to the mission management element through the parent battalion (the Tactical Exploitation Battalion). In the case of a "look-through" capability where the jammer can also act as a COMINT sensor during the jamming mission, the additional intelligence will be reported to the mission management element. A jammer can respond to a SIGINT report directly from a SIGINT sensor, if such a cueing is preplanned.

Movement - Ground based jammers movement assets are the vehicles they are mounted on, the vehicle fuel, and the jammer crew. Movement initiation and reporting are the same as for SIGINT sensors (see section 1.2.1.2.3).

1.2.2 Division Echelon

1.2.2.1 Division Control Units

1.2.2.1.1 Division Mission Management Element

Collection Mission Management - The assets involved in the management of the collection process at division include the G2 Collection Management and Dissemination (CMDS) staff, the CEWI Battalion DTOC Support

Element and Technical Control and Analytical Element (TCAE) staffs, single source analytical teams, and computers. [There are no non-standard effects to be noted, except to highlight the particular vulnerability of computer based systems to degradation due to TREE and EMP effects.] Damage to these will lose the history of collection needed for future tasking.

Jamming Mission Management - The assets involved in the direction of jamming operations at division include the CEWI Battalion EW support section and TCAE staffs, single source analytical teams for SIGINT, and computers.

Fusion Direction - The assets involved in the direction of the multi-source analysis effort include the G2 CMDS staff and the computers used both for information storage and retrieval and in the fusion processing. The capability of fusion is even more vulnerable to degradation if the computer support is degraded.

Communications - Communications assets include tactical radios, the division multichannel signal center (an asset of the division main command post), and messengers.

Movement - The division mission management element will not move in the course of its normal operations. It will, however, displace with the division main command post.

Command and Control - In the execution of collection mission management several decisions are made. Collection assets are allocated, positioned, and tasked to meet the general intelligence requirements, and sensor reports are evaluated to determine if there is any information of immediate use to the force commander. Remote sensor emplacement must be coordinated through the division FSE for cannon launched REMs and through the division G3 for helicopter delivery. The considerations used in these decisions include the division commander's essential elements of information (EEI) and other intelligence requirements (OIR), immediate collection requirements from the division G2 in response to an immediate need of the commander, collection requests from the division fusion center for additional information needed to support on-going analyses, collection tasking from the corps mission management element, requests for collection support from the brigade S2, and the status reports which are sent in from the various collection action units (sensors). The feedback to higher headquarters for collection management includes the requests for collection assistance from the corps mission management element for corps or other assets and the status of corps taskings previously received.

For jamming mission management, the decisions made include the tasking of division level jammers, and the evaluation of jamming end of mission reports to determine the presence of combat intelligence of immediate use to the force commander. In making these decisions, the division jamming support requirements from the division G3 are used along with the status, range and characteristics of the various division level jammers, requests for jamming support from the brigade S2 and S3, and previous sensor reports. Reported SIGINT is also used in the direction of jamming operations. The feedback to higher headquarters consists of the passing of combat intelligence determined in the jamming and associated SIGINT reports (essentially single-source) to the division G2.

Fusion management is the direction of multi-source analytical efforts in response to the commander's need for intelligence. The decisions made include the determination of the type of information required, the time window applicable, and the assets needed to do the fusion job. Specific taskings will consist of requests for clarification of a report, or the requirement for a detailed investigation of a particular area of the battlefield. The considerations used are the immediate requests from the division and brigade commanders for processed intelligence on a particular aspect of the enemy, the division commander's overall guidance concerning the types of information he wants to receive as a matter of course (his EEI), the speed and intensity of the battle, and targeting requirements from the division FSE. Information feedback consists of the passing of intelligence summaries produced by the fusion center to the division G2, and brigade S2 and target intelligence to the division FSE.

1.2.2.1.2 Intermediate Headquarters. Several intermediate headquarters currently exist at division which are considered as C^2 assets in this representation. In the CEWI Battalion at division, there is the Collection and Jamming Company which serves as a parent unit for the Collection and Jamming platoons. The CEWI Aviation Company found in the ACAB organization serves as a maintenance and supply organization for the aircraft carrying sensors and jammers at division. The Ground Surveillance Radar Company is a parent unit for both ground surveillance radars (used by the maneuver forces for local I/EW functions) and the remotely monitored sensors used at division, brigade, and battalion.

1.2.2.2 Division Action Units

1.2.2.2.1 Division Fusion Center. (Currently the G2 All Source Production Section).

Multi-Source Analysis (Fusion) - This unit uses sensor reports of all types, terrain and weather data to determine enemy location, strength, and intent. It uses its own staff and computer data bases to do detailed correlation and aggregation of the reported data. While the standard effects apply, including the high vulnerability of the process to computer damage, (which would cause a degradation in the process and not a complete disruption), the staff involved is very highly skilled and difficult to replace if wounded or killed through enemy action. The fusion process is an on-going one; officially begun when the division commander specifies his EEI, and continued by the commander's requests for information as the battle progresses. During the fusion process, answering one question may generate another, thus creating an internal form of tasking as well.

The conclusions derived from the multi-source analysis are reported to the division mission management element for dissemination to the force commanders involved (corps, division and/or brigade). Target development information is also reported to the division mission management element for transmission to the division FSE for targeting, except where the sensor has a direct QUICKFIRE channel to the division FSE for targeting.[25]

Movement - The division fusion center will not move in the normal course of its operation. It will displace, however, with the division main command post, and operate at a degraded level during the move.

1.2.2.2.2 SIGINT Sensors

Signals Intelligence Collection - In the collection of signals intelligence the assets involved consist of both ground based sensors (such as the TRAILBLAZER system), and airborne COMINT and ELINT sensors, (e.g., the QUICKLOOK system), ground processing stations, operators, and the tactical radios by which tasking is received and reports are sent back to the control unit.

SIGINT collection missions come from the division mission management element (through the appropriate parent unit) to a particular sensor for execution. In many cases, the sensor will have to relocate prior to starting the mission. Sensor reports are prepared by the operator and transmitted by tactical

radios to the processing center. For airborne systems, the data is downlinked via secure tactical radios or digital transmissions to the ground processing station and the data is forwarded to the mission management element as formatted sensor reports for inclusion into the fusion process, except when sensor data is downlinked directly to the fusion center without processing. Some SIGINT reports will trigger an immediate jamming mission, depending on the jamming mission tasking. The sensor system status and location is reported to the mission management element through the parent battalion.

Movement - For movement, ground based systems are mounted on trucks or APC's, and airborne SIGINT systems use helicopters. Other assets include the tactical radios used to direct movement, the fuel required to move, and the crew required to assemble or disassemble the ground based equipment and/or required to fly the aircraft.

SIGINT sensors can move in response to a mission tasking that requires repositioning because of a self determined need to better locate itself for collection, or from a predetermined flight route (airborne systems). The enemy can also induce movement of a SIGINT sensor by indirect fire attacks, direct attacks, or air to ground attacks for airborne systems, or air defense and/or air to air attacks for airborne systems. In addition, airborne systems have an on-station time restriction associated with the consumption of aircraft fuel.

In response to a movement, SIGINT sensors will report the cause for changing position, the new location and expected time of arrival, and the ready status. These reports are sent to the division mission management element through the parent units of the sensors.

1.2.2.2.3 Reconnaissance/Surveillance Sensors

Reconnaissance/Surveillance (R/S) - The capability for R/S at the division level is provided by airborne moving target indicator (MTI) radars, configured on helicopters. Assets here include the radars, helicopters, aircraft crew, radar operators, aircraft fuel, and ground processing stations and operators. With regard to effects, the air-to-ground links used for positioning and data reporting are vulnerable to enemy electronic countermeasures.

R/S missions are processed in a similar manner as to airborne SIGINT missions noted in the previous section.

Movement - R/S aircraft movement is dependent on the aircraft, crew, and fuel available. Of particular note is the limitation on the mission duration imposed by the aircraft performance and fuel availability. Movement is caused by the same triggering events as those for aerial SIGINT collection, i.e, mission tasking, a self-determined need for relocation, or enemy fire. The information reported is again the cause for movement, the new location and the mission ready status.

1.2.2.2.4 Remote Sensors (REMs teams)

Remote Surveillance - Remotely monitored sensors are typically used to detect enemy activity in isolated areas or on critical avenues of approach. The assets used include the expendable sensors (acoustic, seismic, magnetic, and strain-cable) and relays, monitor operators, tactical radios, and fuel for generators. Most are passive devices and transmit only when activated. High noise levels due to thunder, rain and/or wind may degrade acoustic system abilities to detect enemy activity.

Mission tasking comes from the division mission management element through the GS Radar Company. REMs reports and unit status reports are sent to the mission management element through the GS Radar Company.

Sensor/Repeater Emplacement - Sensor/repeaters are usually emplaced either by field artillery or aviation elements. In a retrograde movement, the REMs teams can emplace the systems themselves. REMs emplacement locations are received from the division G2 collection mission management element and the REMs teams confirm successful emplacement back to that control element.

1.2.2.2.5 Division Level Jammers

Jamming - In the jamming of enemy communications and radar frequencies, division controls both ground based and airborne assets. The airborne system is colocated with airborne SIGINT system, QUICKFIX. The assets involved are the jammers and jammer operators, the vehicles used (truck or aircraft), the vehicle fuel and the tactical radios used to receive direction and to report results.

Jamming missions originate from the division mission management element, and through a predetermined relationship with a particular SIGINT sensor so that SIGINT data can spark a target of opportunity jamming mission. The action unit (the jammer) reports both the mission status, and its

own status to the mission management element through the parent unit. In the case of a "look-through" capability where the jammer can also act as a COMINT sensor during the jamming mission, the additional intelligence will be reported to the mission management element.

Movement - Ground based and airborne jammers' movement assets include the vehicles they are mounted on, the vehicle fuel, and the jammer crew. Movement initiation and reporting are the same as for SIGINT sensors (see section 1.2.1.2.3). Of particular note is the on-station time limitation caused by a fuel limitation for aircraft systems.

1.2.2.2.6 Long Range Reconnaissance Patrols (LRRPs). Refer to paragraph 1.2.1.2.2 for discussion of LRRP capabilities at corps. At division, tasking will come from the division mission management elements.

1.2.3 Brigade Echelon

1.2.3.1 Brigade Control Units

1.2.3.1.1 Brigade S2 Staff

Collection Coordination and Tasking - The brigade S2 coordinates with the brigade S3 and the division mission management element for collection tasking of SIGINT and R/S assets in its area of operations (the Collection and Jamming Platoon and REMs teams). The assets involved are the brigade S2 staff, the I/EW support element from the CEWI Battalion, tactical radios and the Forward Area Signal Center (FASC). In addition, the brigade S2 can issue intelligence collection requirements to its maneuver battalions and non-I/EW activity.

Jamming Coordination and Tasking - The brigade S2 coordinates its jamming needs with that of the division in the brigade area. The assets involved include the brigade S2 staff, the I/EW support element from the CEWI Battalion, and the communications means noted above.

Communications - As noted above, the brigade S2 uses tactical radios, the divisional multichannel system (the FASC) and messengers.

Movement - The brigade S2 staff will displace with the brigade main command post. This movement of the brigade CP will not impose a restrictions on its operation as a control element.

Command and Control - The brigade does not have organic I/EW assets it can task directly. The collection and jamming assets operating in the brigade area, however, can provide support to the brigade S2 as long as his requests do not conflict with the division mission management tasking. There are three major ways the brigade can obtain collection and/or jamming support from divisional assets. First, the brigade S2 submits the brigade's collection and jamming requirements package for a particular operation or collection requests from the maneuver battalions, and other non-I/EW elements, and the division mission management element uses these requests in the development of the divisional collection/jamming plans. Second, the brigade can obtain informal or non-preplanned I/EW support on a mission by mission basis. The brigade S2 staff coordinates with the S3 for the "tasking" of a collection or jamming mission and the S3 will issue a formal tasking to the sensor or jammer action unit. The action unit would report the tasking to the division mission management element for review and approval. The division mission management element may approve, deny, and/or reallocate the mission according to the division wide collection or jamming priorities, and according to the geography involved. If approved, the action unit is formally tasked by the division mission management element and the action unit executes the mission. Third, the division can attack divisional I/EW assets on a DS basis to the brigade which the brigade S2 will be able to task directly.[25] This arrangement would probably be utilized in the more fluid context of the Air Land Battle 2000 or other special operations.

The range of decisions used in the brigades collection and jamming direction include the requests to the division mission management element for attached collection assets, in particular the ground surveillance radars and remote sensors. The brigade S2 consolidates its battalions intelligence requirements to form a brigade intelligence requirements package and submits it to the division mission management element. It also makes special requests for specific tasking of divisional assets as noted above.

The considerations used are the brigade commander's intelligence requirements, attached unit status reports, and collection requests from the maneuver battalions.

Brigade feeds back requests for division level I/EW support, combat information from non-I/EW sources such as forward patrols, and attached I/EW unit status reports to the division mission management element.

1.2.3.2 Brigade Action Units

1.2.3.2.1 Remote Sensors

Remote Unattended Surveillance - The assets involved in REMs employment at brigade are the same as those under division control. Refer to the division level REMs action unit for a detailed discussion.

Sensor/Repeater Emplacement - Again, the emplacement is the same as at division, except that the fire support contact is the brigade FSE.

APPENDIX V

FIRE SUPPORT FUNCTIONAL AREA REPRESENTATION OBJECTIVES

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(Concluded)

1.0 FIELD ARTILLERY SUBFUNCTIONAL AREA REPRESENTATION OBJECTIVES

The organizational representation is depicted in Figure V-1.

1.1 Standard Effects

The effects of performing the function of field artillery fire support and the effects upon the capability of control and action units to perform the function are presented here, organized within five categories:

- Effects of executing the function on the enemy, on the environment, and on assets
- Effects of combat on unit capability to perform the function
- Effects of the environment on unit capability
- Situational factors to be considered
- Effects from other functional areas

1.1.1 Effects of Executing the Capability on Targets, the Environment and Assets

This subparagraph describes the effects on the enemy, environment and the unit's own assets of performing each of the capabilities.

1.1.1.1 Planning and Situation Assessment. Execution of this capability has no direct significant effect on the enemy or the environment.

Assets used in performing the capability include staff personnel and ADP equipment (e.g., TACFIRE).

1.1.1.2 Communications. Execution of the capability has no direct significant effect upon the enemy or the environment.

Communications require use of the following assets: communications nodes and links and the staff personnel to send and receive the messages.

1.1.1.3 Delivery of Fires. Delivery of conventional fires has the following deliberate effects upon the enemy depending on the type target and ammunition: damage to the target (casualty and equipment losses), weapon suppression, interdiction and battlefield obscuration.

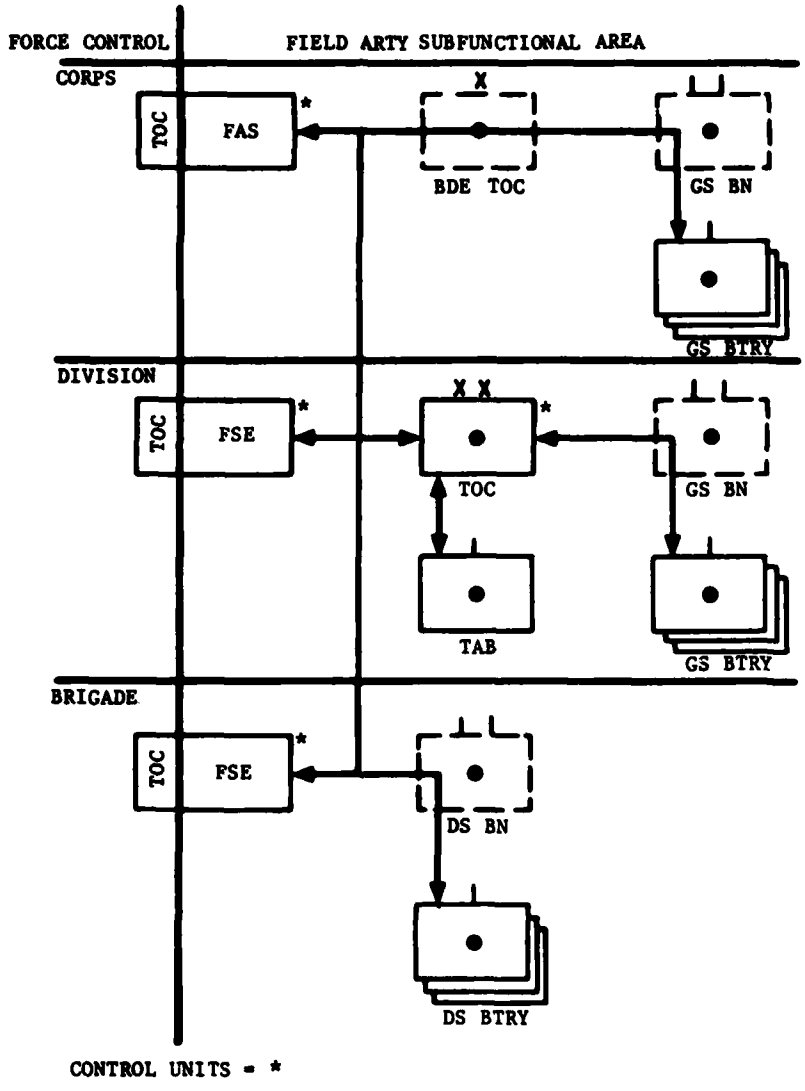

FIGURE V-1
FIELD ARTILLERY SUBFUNCTIONAL AREA

Conventional fire delivery affects the environment by creating unintentional battlefield obscuration and thus may hinder enemy mobility as well as observation by both sides; artillery units occupy terrain while in position; [and illumination missions improve observation during night operations]. The effects upon assets are the consumption of ammunition and the operational degradation of end items.

Chemical fires are delivered to create casualties and contaminate equipment and terrain, thereby having both immediate and delayed effects. The enemy is forced to make tradeoffs of risk and time in continuing to occupy or pass through a contaminated area. Use of chemical weapons will also have an effect on the environment, by contaminating atmosphere and terrain. Chemical ammunition assets will be expended and delivery weapons will sustain operational degradation.

Nuclear fires have both direct, casualty-producing effects and secondary effects. Casualties will be both immediate and delayed, depending on time and degree of exposure. Nuclear fires will cause tree blowdown, cratering, fires, and rubble, thereby affecting the environment. [Communications will be affected by electro-magnetic pulse (EMP) and transient radiation electromagnetic effects (TREE).] Nuclear ammunition assets will be expended in the delivery of fires and delivery weapons will sustain operational degradation.

1.1.1.4 Movement. Movement of artillery units has no direct significant effect upon the enemy. The effect of movement upon the environment is the use by the artillery units of road networks for ground movement. Moving units will use organic vehicles if by ground or support air assets if the movement is by air.

1.1.1.5 Target Acquisition. Target acquisition does not directly affect the enemy or the environment. [The most significant effect upon friendly assets is the operational degradation of major end items.]

1.1.2 Combat Effects on the Capability

This subparagraph addresses the effects of enemy combat action upon the capability of artillery units to perform their functions.

1.1.2.1 Planning and Situation Assessment. Enemy air, long range artillery, nuclear, chemical and ground attacks on command nodes will disrupt the ability of control units to perform planning and situation assessment. [EMP can degrade fire systems involving electronic components.]

1.1.2.2 Communications. Enemy air, artillery, nuclear, chemical and ground attacks on communication nodes can disrupt the flow of orders and information between control and action units. Jamming can have a similar effect, [as can the EMP and TREE effects of nuclear weapons].

1.1.2.3 Delivery of Fires. Enemy air, artillery, nuclear, chemical and ground attacks will cause suppression of artillery units' ability to deliver fire. Nuclear and chemical attacks can have time-dependent effects and necessitate tradeoffs of risk and time by friendly forces. [Fire support systems involving electronic components can be degraded by EMP.] Nuclear delivery units are especially vulnerable to attack, both while moving and while closing in position.

1.1.2.4 Movement. Enemy air, artillery, nuclear, chemical and ground attacks will hinder the ability of artillery units to move.

1.1.2.5 Target Acquisition. Target acquisition means have increased vulnerability to attack because of their exposed and often isolated positions and their electronic signature. Target acquisition means of the TAB are also susceptible to ECM [and may become saturated due to high battle intensity. The sound and flash unit is subject to deception].

1.1.3 Environmental Effects on the Capability

This subparagraph addresses the effects of weather, terrain and combat environment upon the capability of artillery units to perform their functions.

1.1.3.1 Planning and Situation Assessment. Weather and terrain will not have any significant effect on planning or situation assessment. Unit performance may be degraded as a result of [personnel stress or fatigue, or] the requirement to operate in mission oriented protective posture (MOPP). [Electronic equipment operation may be degraded by EMP or TREE.]

1.1.3.2 Communications. [Weather extremes (e.g., electrical storms) can degrade radio communications. Terrain extremes (high mountains) can shorten the effective range of communications.] Unit performance will be degraded as a result of [personnel stress or fatigue, or] the requirement to operate in MOPP. [Communication may be interrupted by EMP or TREE.]

1.1.3.3 Delivery of Fires. Weather extremes affecting visibility can degrade weapon delivery of precision guided munitions. Weather such as wind,

rain and snow can enhance or degrade the effects from nuclear and chemical weapons.

Terrain extremes can limit the delivery of fires (terrain masking) and can enhance or degrade conventional, chemical and nuclear weapon effects (e.g., vegetation can affect conventional weapon effectiveness, hills and valleys can channel nuclear and chemical effects). Unit performance will be degraded as a result of [personnel stress or fatigue, or] the requirement to operate in MOPP. [Fire direction equipment operation can be affected by EMP or TREE.] Contaminated equipment will require decontamination or special handling, resulting in further time delays and/or casualties.

1.1.3.4 Movement. Terrain type, road network availability, and weather can enhance or degrade unit movement capabilities. Unit performance will be degraded as a result of [personnel stress or fatigue, or] the requirement to operate in MOPP. Movement will be restricted through contaminated areas or as the result of tree blowdown, rubble, craters, fires or minefields. Vehicle contamination will cause time delays and/or casualties.

1.1.3.5 Target Acquisition. Both weather and terrain affect target acquisition by restricting line of sight for visual observation; terrain can restrict radar line of sight, and radar capabilities can be limited due to atmospheric disturbances. Unit performance may be degraded as a result of [personnel stress or fatigue, or] the requirement to operate in MOPP. Equipment that requires decontamination or special handling results in time delays and/or casualties.

1.1.4 Situational Factors

This subparagraph discusses possible effects upon unit capabilities of situational factors such as the status of personnel and equipment.

1.1.4.1 Planning and Situation Assessment. The capability to perform planning and situational assessment will be affected by the operational condition of TACFIRE equipment, unit strength, [and training].

1.1.4.2 Communications. The capability to communicate with other units will be affected by the operational condition of communications equipment, unit strength, [and training].

1.1.4.3 Delivery of Fires. The capability to deliver fires will be affected by the operational status of weapons.

1.1.4.4 Movement. Artillery units require some time delay to transition from moving to a ready to fire status. The capability to conduct movement will be affected by the operational status of vehicles and the availability of POL.

1.1.4.5 Target Acquisition. Movement of target acquisition assets is coordinated to provide uninterrupted coverage when possible. Large scale movement may require simultaneous movement of TAB assets and consequent periods of non-coverage. The capability to conduct target acquisition will be affected by the operational status of equipment [and the availability of trained personnel].

1.1.5 Effects from Other Functional Areas

This subparagraph discusses the effects of other functional areas on the capabilities of units to perform their functions.

1.1.5.1 Planning and Situation Assessment. Replacement of TACFIRE equipment by combat service support units will have the most immediate impact on planning and situation assessment.

1.1.5.2 Communications. [Maintenance and replacement of communications equipment by combat service support units will have the most immediate impact on communications.]

1.1.5.3 Delivery of Fires. Unit capability to deliver fires will be degraded most directly by lack of ammunition, personnel replacements, [equipment maintenance] and end item replacement. Unit vehicles are needed for resupply of ammunition and POL.

1.1.5.4 Movement. Combat service support required to maintain a unit's capability to move are fuel (POL) supply, [vehicle maintenance] and end item replacement.

1.1.5.5 Target Acquisition. The capability of TAB assets to provide target acquisition is most directly affected by the combat service support capabilities of [maintenance and] major end item replacement.

1.2 Functional Representation

This section discusses the capabilities of the control and action units which are considered significant in the representation of the subfunctional area. Effects upon the capabilities are standard unless specifically listed.

1.2.1 Corps

1.2.1.1 Control Units

1.2.1.1.1 The Corps Field Artillery Section (FAS). The FAS includes the Operations and Intelligence (O/I) Element and the Fire Support Element (FSE), together with Navy and Air Force representatives. The O/I Element plans, coordinates and executes field artillery support for the corps; the FSE plans and coordinates all fire support for the corps.

Situation Assessment and Planning - The FAS has the capability of performing situation assessment in the planning and coordination of fire support for the corps. The principal assets which the FAS has to conduct situation assessment and planning are the fire support element personnel with Air Force and Navy representatives, and the operations/intelligence element with TACFIRE equipment and operators.

Communications - The FAS has the capability of transmitting and receiving communications in order to obtain information for and transmit the results of decisions. The FAS relies on radio, wire, multichannel and messenger for communications, mainly provided through the Corps CP.

Command and Control - The range of decisions which are made at the FAS, and transmitted to the artillery units and Navy and Air Force representatives as appropriate include the following:

- Determination of the field artillery organization for combat (transmitted through intermediate headquarters to the field artillery batteries)
- Amplification of the corps commanders planning guidance and restrictions (transmitted to the Navy and AF representatives, and through the intermediate headquarters to the FA units)
- Assignment of priority of fires (transmitted to the AF and Navy representatives and through the intermediate headquarters to the FA batteries)
- Assignment of targets to fire support assets (transmitted through the intermediate headquarters to the FA batteries or to Navy or Air Force representatives)

- Development of the corps fire support plan (including the field artillery support plans) (transmitted to the FA units and Navy and Air Force representatives)

- Coordination of FA unit movement (transmitted to the FA unit concerned

In reaching the above decisions, the FAS considers the following:

- The mission planning guidance received from Corps

- The availability of nuclear and chemical weapons (received from FA units, Navy and Air Force represenatives) and release authority (received from corps)

- The status of units, which it receives through intermediate headquarters from the GS batteries

- The availability of other fire support means, which it receives from Air Force and Navy representatives in the FSE

- Target intelligence, which it receives from the the corps fusion center and the corps G2 and G3 sections or over a direct QUICKFIRE channel with a target sensor

- Requests for fire support (received from the division FSE)

- The plan of maneuver and current operations orders, which it receives from corps

The FAS provides feedback to the corps headquarters (TOC) by means of the corps fire support plan, situation reports reflecting significant incidents and combat effectiveness, [and NBC reports (STANAG)].

1.2.1.1.2 Field Artillery Brigades and Battalions Maintained Under Corps Control. These headquarters operate TOCs to control and coordinate the operation of subordinate artillery units; however, the corps FAS provides tactical fire control and prepares the field artillery support plan. The brigade and battalion headquarters can therefore be represented as additional command and control assets of the corps FAS.

1.2.1.2 Action Units. The action units retained under corps control for the delivery of fire are the heavier, longer range weapons units with which the corps commander can influence the action over the corps area of interest (AI) which extends beyond the division AI. These normally consist of the missile battalion and/or multiple launcher rocket system (MLRS) battalions, but can include extended range cannon battalions.

1.2.1.2.1 General Support (GS) Btry

Delivery of fires - The GS battery has, as its principal assets involved in the delivery of fires, the fire direction center (FDC) equipment and personnel; the missile, rocket, or gun section weapons, ammunition and personnel; and communication equipment and personnel.

Delivery of fires will be initiated through plans for scheduled fires, through orders to fire on call fires or in answer to immediate fire requests, which are normally received from the corps FAS through intermediate headquarters. Reports are made to the corps FAS (through intermediate headquarters) by means of situation and completed mission reports on missions fired, ammunition expended and combat effectiveness.

Movement - The GS battery has its organic vehicles and drivers to perform movement of unit equipment and personnel. Communications equipment and operators are used to transmit unit movement reports.

Movement execution is initiated through plans for scheduled moves, through orders received through intermediate headquarters from the corps FAS, as a survivability tactic or as a result of attack. Movement reports are made to the corps FAS (through intermediate headquarters) by situation status reports reflecting movement, completion or ready to fire.

1.2.2 Division

1.2.2.1 Control Units

1.2.2.1.1 Division Fire Support Element (FSE).

Situation Assessment and Planning - The FSE has the capability of performing situation assessment in the the planning and coordination of fire support for the division. The principal assets of the FSE used in assessment and planning are the FSE personnel, including representatives of other fire support means (Navy and Air Force), and the TACFIRE data bases at divarty (available through remote terminals).

Communication - The FSE uses radio, wire, [messenger], and multi-channel (provided through the division CP) for its communications.

Command and Control - The FSE has the following range of decisions regarding fire support:

- Amplification of the division mission planning guidance (transmitted to Air Force and Navy representatives and to divarty)
- Determination of the organization of fire support means for combat (transmitted to the divarty TOC and AF and Navy representatives)
- Assignment of priority of fires (transmitted to divarty TOC, AF and Navy representatives)
- Assignment of targets to fire support means (transmitted to the divarty TOC, AF or Navy representatives)
- Composition of fire support plans with field artillery and nuclear and chemical support plans (transmitted to divarty TOC, AF and Navy representatives)
- Generation of requests for additional fire support (requested from the corps FAS)

The FSE considers the following items when making the above decisions:

- Mission planning guidance and restrictions from division
- The availability of nuclear and chemical weapons (which it receives from divarty, AF and Navy representatives) and release authority (received from division)
- The status of FA units, which it receives from situation reports received from the divarty TOC
- The availability of other fire support means, which it receives from Navy, Air Force and other fire support representatives at the FSE

- Target intelligence and information which it receives from the division fusion center, the division G2/G3, and brigade FSE or directly from a target sensor over QUICKFIRE channels

- Current plans and operations orders (received from division)

- Requests for additional fire support (received from brigade FSE)

The FSE provides information to the corps FSE and div TOC by means of plans, situation reports reflecting significant enemy action, [and STANAG reports].

1.2.2.1.2 Division Artillery Tactical Operations Center (Divarty TOC)

Situation Assessment and Planning - The divarty TOC has the capability of performing situation assessment and the planning and coordination of field artillery fire support for the division. The assets which are used by the divarty TOC in situation assessment and planning are the divarty staff personnel and the TACFIRE equipment and operators.

Communication - The divarty TOC uses radio, wire, multi-channel (provided by an attached signal center) [and messenger] for its communications.

Command and Control - The divarty TOC has the range of decisions listed below regarding field artillery fire support. These decisions are directed to general support (GS) units maintained under division control and to the target acquisition battery (TAB).

- Assignment of targets to assets (transmitted to firing unit concerned)
- Composition of the division field artillery support plan (including the target acquisition annex) (transmitted through battalions to batteries)
- Development of positioning guidance for GS bn and TAB
- Assignment of zones and priorities of observation to TAB

The divarty TOC considers the following items in reaching the above decisions:

- Mission planning guidance and restrictions (received from the FSE).
- The availability of nuclear and chemical weapons (received from FA units) and release authority (received from division).
- The status of units (from situation reports received from GS units and the TAB).
- Target intelligence from the division FSE, TAB assets, air observers, and as developed by the staff (targeting element).
- Current plans and operations orders (from the FSE).

The divarty reports its plans and actions to the division by means of the field artillery fire support plan, divarty situation reports reflecting significant enemy action and combat effectiveness, and [STANAG reports]. The divarty also informs the SHORAD battalion TOC of status, plans and activities.

1.2.2.1.3 Battalion Headquarters Maintained in General Support (GS) of the Division. For modeling purposes the GS battalion headquarters should be represented as an additional command and control asset of the divarty TOC.

1.2.2.1.4 Attached Field Artillery Brigade Headquarters and Battalions. FA brigade headquarters and battalions may be attached to the division by corps. These may be kept in general support (GS) of the division, be assigned a reinforcing role, or a brigade with its battalions may be assigned in direct support of a maneuver brigade. In the GS role, the headquarters can be represented as additional command and control assets of the division and the firing units as additional action units. In the reinforcing role, the batteries can be represented as an additional action unit of the brigade FSE. In a direct support role the FA brigade would operate the FSE for the maneuver brigade.

1.2.2.2 Action Units. The action units retained under division control are the heavier, longer range weapons with which the division commander can influence the action over the division area of interest. This usually consists of the 8" howitzer battalion (or a combined 8"/MLRS bn).

1.2.2.2.1 GS Battery. The principal capabilities of the GS battery are the delivery of fires and unit movement.

Delivery of Fires - The principal assets which the battery has to assist in the delivery of fires are the battery FDC personnel and equipment; the weapons, ammunition and firing battery personnel; and the communications equipment and personnel. Delivery of fires can be initiated by orders to execute planned fires and by immediate fire mission requests received from the FSE, the divarty air observers or the TAB acquisition means. Situation and completed mission reports are made to the divarty TOC reflecting damage assessment for observed fires and combat effectiveness.

Movement - The battery moves weapons, personnel and equipment using organic vehicles and uses communications equipment and personnel to report movement status. Moves are initiated as a result of plans to support the scheme of maneuver, requirements to attack targets outside the weapon coverage fan, as a survivability tactic, or as a result of enemy action. Reports are made to divarty reflecting changes in status (movement, in position, ready to fire).

1.2.2.2.2 Target Acquisition Battery (TAB). The principal capability of the TAB is the acquisition of targets, particularly counterfire targets (enemy artillery). Implicit in this capability is the movement and positioning of the unit assets. Because movement is controlled by divarty to provide continuity of coverage, it is not considered to be significant enough to require explicit representation, i.e., while interruption in coverage should be modelled, the explicit representation of the sensor moving between positions is not necessary.

Target Acquisition - TAB assets for target acquisition are weapons locating radar sections, moving target locating radar section, sound/flash platoon, processing section (considered as part of the targeting element of the divarty TOC), and the communications equipment and personnel to report target acquisition. Initiating events for target acquisition include orders and positioning from divarty TOC as part of current plans or as a result of enemy action. The TAB reports enemy location, activity and information to the divarty TOC and also submits status readiness reports.

1.2.3 Brigade

1.2.3.1 Control Units

1.2.3.1.1 Brigade FSE. The brigade FSE has the primary capabilities of situation assessment and planning, communication and command and control.

Situation Assessment and Planning - The brigade FSE assets with which to conduct situation assessment and planning are the FSE personnel, including Navy and Air Force representatives, and the DS BN TACFIRE data base (accessed through remote terminals).

Communication - The brigade has radio, [messenger] and wire assets with which to communicate.

Command and Control - The brigade FSE has the following range of decisions with regard to fire support for the brigade.

- Assignment of targets to fire support assets
- Assignment of priority of fires, and
- Generation of requests to the division FSE for additional fire support.

The brigade FSE considers the following items in reaching the above decisions:

- Mission planning guidance and restrictions from brigade
- The availability of nuclear and chemical weapons (from FA units NGF and AF) and release authority (from division FSE)

- Unit status (from firing unit situation reports)
- Availability of other fire support means (from NGF and Air Force representatives)
- Target intelligence (from artillery observers, TAB, and division TOC)
- Plan of maneuver and current operations orders (from brigade)

The brigade reports its fire support activities and situation to the division through fire support plans, situation reports reflecting significant enemy activity, combat effectiveness, and [STANAG reports].

1.2.3.1.2 DS Battalion Headquarters. For modeling purposes, the DS battalion headquarters should be represented as a command and control asset of the brigade FSE.

1.2.3.2 Action Units

1.2.3.2.1 DS Battery. The DS battery has the primary capabilities of delivery of fires and movement.

Delivery of Fires - The assets with which the battery conducts the delivery of fires are the battery FDC personnel and equipment; the weapons, ammunition and firing battery personnel; the communication personnel and equipment; the fire support team (FIST) and the observers. Initiating events for the delivery of fires are orders or requests received to execute planned or immediate fire missions from the brigade FSE or observers located with maneuver units.

Movement - The battery uses organic vehicles for movement and communication equipment for movement reports. Initiating events for movement are orders to move in accordance with plans, as a survivability tactic, or as a

result of enemy action. Status reports are made to inform the FSE when the unit is moving, in position or ready to fire.

Situation and completed fire mission reports are made to the FSE regarding significant activities, combat effectiveness, and mission status.

2.0 AIR POWER

The functional representation is not broken down by maneuver echelon in this case because of the simplified handling of control and action units. The representation is given in Figure V-2. Although the ASOC is shown communicating with the Air Force Tactical Unit Operations Center (TUOC) in order to scramble the mission, the TUOC is treated here as an asset of the ASOC.

The planning and control of Air Force missions which are outside Army channels should have limited representation within a Corps/Division level model. Apportionment of air assets for various air missions and among corps or geographic areas is a function of the joint force commander. It is appropriate then that apportionment of assets and other primarily Air Force Control functions, such as "packaging" of battlefield air interdiction (BAI) missions, be handled external to the model. Because the planning, packaging, control and execution of BAI missions are external to Army control, the target effects may be handled parametrically or determined external to the model.

2.1 Standard Effects

The effects of providing close support air power (both close air support and battlefield air interdiction) and the effects upon the capability of control and action units to perform the function are presented here, organized within five categories:

- Effects of executing the function on the enemy, on the environment and on assets
- Effects of combat upon unit capability to perform the function
- Effects of the environment on unit capability
- Situational factors to be considered
- Effects from other functional areas.

2.1.1 Effects of Executing the Capability on Targets, the Environment, and Assets

This subparagraph describes the effects upon the enemy, the environment and the units' own assets of performing each of the capabilities.

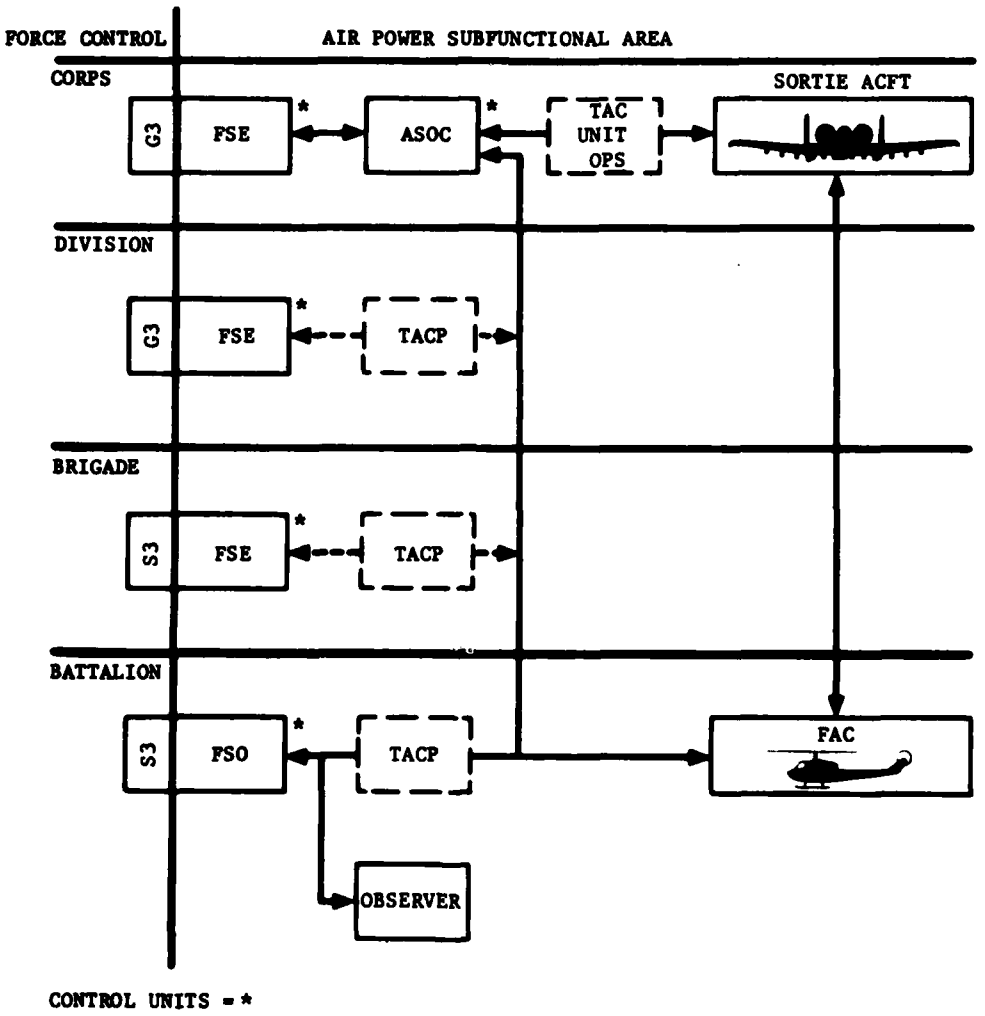

FIGURE V-2
AIR POWER SUBFUNCTIONAL AREA

2.1.1.1 Communications. Execution of this capability has no direct effect upon the enemy or the environment. Assets used for communication are the communications personnel and equipment.

2.1.1.2 Delivery of Fire. The effects of the delivery of air support fire power include many of the same effects as those of field artillery fire delivery, including conventional, chemical, and nuclear fires. Both close air support (CAS) and battlefield air interdiction (BAI) are flown in direct support of land operations and are targeted against hostile surface targets which are in position to directly affect friendly forces. CAS missions are against targets in close proximity to friendly forces and require continuous coordination during execution. BAI missions are against enemy forces not yet in contact, require detailed planning, and emphasize the delay and disruption of enemy movement.

The effects on assets are [the consumption of Air Force ammunition and POL as well as] the use of allocated sorties, [and other Air Force support and control].

2.1.2 Combat Effects on the Capability

This subparagraph addresses the effects of enemy combat upon the control and action unit capability to perform their functions.

2.1.2.1 Communications. Communications can be disrupted in the same manner as discussed under field artillery, that is, they can be disrupted through attacks on the nodes or through jamming. In addition air-to-ground and air-to-air communications can be disrupted.

2.1.2.2 Delivery of Fire. Enemy ground air defense and combat air action can limit the use of air power, degrade its effectiveness or make its use costly. Enemy attacks against airfields can also degrade the availability of air support.

2.1.3 Environmental Effects on the Capability

This subparagraph discusses possible effects of weather, terrain and the combat environment upon the capability of units to perform their functions.

2.1.3.1 Communications. Atmospheric conditions (e.g., electrical storms) can degrade radio communications.

2.1.3.1 Communications. [Atmospheric conditions (e.g., electrical storms) can degrade radio communications.]

Terrain extremes can shorten the effective range of communications but will have less effect on air-to-ground or air-to-air communications.

[Communications may be interrupted by EMP and TREE.]

2.1.3.2 Delivery of Fire. Limited visibility and weather will restrict air power availability and limit delivery accuracy. Weather and terrain can enhance or degrade nuclear and chemical weapons effects.

Action and control unit capability can be degraded in a chemical or nuclear environment because of [personnel stress, fatigue or] the requirement to work in MOPP.

2.1.4 Situational Factors

This subparagraph discusses possible effects upon unit capabilities of situation factors such as unit status and the availability of airfields.

2.1.4.1 Communications. Heavy communications traffic will necessitate prioritization of message traffic and result in time delays of message transmission.

2.1.4.2 Delivery of Fires. Capability to deliver airpower will be affected by unit status which can be degraded as a result of prior casualties and equipment losses. Operations can be restricted in the areas of known or planned detonations or contamination in order to restrict losses. The availability of airpower will also be affected by the location of useable airfields.

2.1.5 Effects from Other Functional Areas

[This subparagraph presents possible effects upon unit capabilities of other functional areas such as combat service support. While the supply of ammunition and fuel, maintenance, end item replacement and personnel replacement are Air Force CSS functions, they are necessary to the availability of airpower and must be implicitly assumed if not modeled directly.]

2.2 Functional Representation

2.2.1 Control Unit

2.2.1.1 The Air Support Operation Center (ASOC). The ASOC is normally collocated with the Corps TOC and FAS. It principally operates to receive requests for immediate air support, to coordinate these requests with the G3 air and FSE, and to then order the mission flown if no disapproval is received. For this reason, its primary capability is considered to be that of communications. The assets with which it performs this capability are the personnel, equipment and communication links with the corps FSE, TACP's and Tactical Unit Operation Center (TUOC).

The Air Force control units for BAI, particularly the Tactical Air Control Center, have not been indicated on the representation chart, following the decision not to model functions handled externally to Army control.

2.2.2 Action Unit

2.2.2.1 Close Air Support - Aircraft Sorties. Sorties have the principal capability of fire delivery for the purpose of this subfunction. The assets which are affected in the delivery of fires are the aerial platforms (aircraft), the ammunition used by the aircraft, and, in the case of close air support, the forward air controller who directs the fighter onto the target.

Initiating events for airstrikes are the plans and requests for preplanned or immediate close air support.

Reports are made to the requesting and concerned headquarters in the form of completed mission reports and battle damage assessment (BDA) when available. BDA reports may be submitted by the attack aircraft, or forward air controller (FAC), ground observer or by aircraft designated to perform post-strike damage assessment.

2.2.2.2 Battlefield Air Interdiction - Mission Package

BAI missions require a variety of attack and support aircraft. It is not recommended that all the individual aircraft be handled explicitly in the model but rather that mission losses be handled parametrically or externally to the model. The resultant effect on the target might be similarly determined and the losses or delays assessed against the appropriate units.

3.0 NAVAL GUN FIRE

The organizational representation is shown in Figure V-3.

3.1 Standard Effects

The effects of providing naval gunfire and the effects upon the control and action units to perform this function are presented here, organized within five categories.

- Effects of executing the function on the enemy on the environment and on assets
- Effects of combat upon the unit capability to perform the function
- Effects of the environment on unit capability
- Situational factors to be considered
- Effects from other functional areas

3.1.1 Effects of Executing the Capability on Targets, the Environment, and Assets

This subparagraph describes the effects upon the enemy, the environment and the units' own assets of performing each of the capabilities.

3.1.1.1 Communications. Execution of this capability has no direct effect upon the enemy or the environment.

Assets used for communication are communications personnel and equipment.

3.1.1.2 Delivery of Fires. The effects of the delivery of naval gunfire are similar to those of field artillery, whether conventional, chemical or nuclear.

[The effects on assets are the consumption of naval gun ammunition and fuel.]

3.1.2 Combat Effects on the Capability

This subparagraph discusses the effects of enemy combat upon the control and action unit capability to perform their functions.

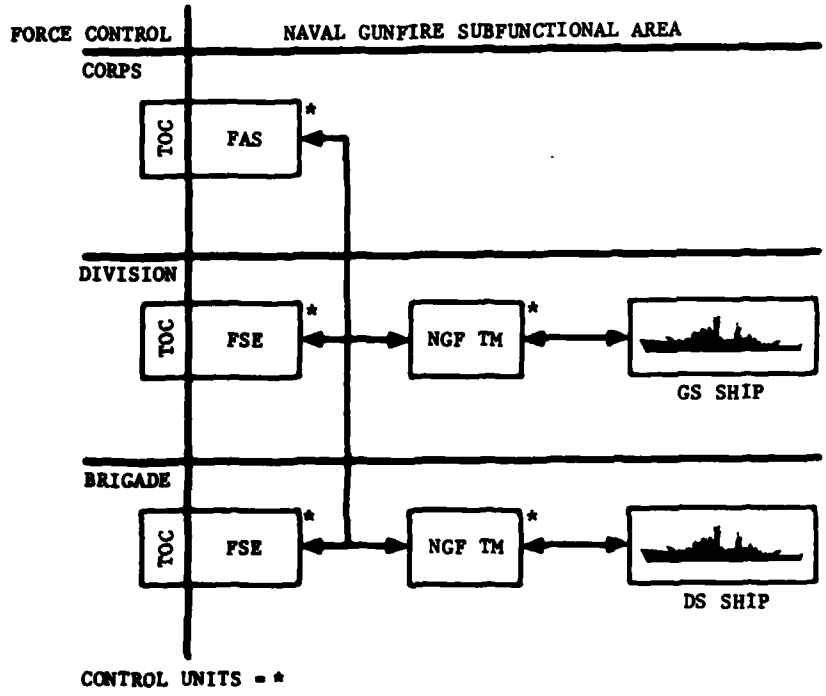

FIGURE V-3
NAVAL GUNFIRE SUBFUNCTIONAL AREA

3.1.2.1 Communications. Communications can be disrupted in the same manner as discussed under field artillery. In addition ship-to-shore communications can be disrupted.

3.1.2.2 Delivery of Fire. [Enemy air or naval attack on the naval support ships will limit the availability of naval fire support.]

3.1.3 Environmental Effects on the Capability

This subparagraph discusses the possible effects of weather, terrain and hydrography -- the availability of a water body proximate to the battle area -- upon the capability of units to perform their functions.

3.1.3.1 Communications. Weather extremes can degrade radio communications. [Communications may be interrupted by EMP or TREE.]

3.1.3.2 Delivery of Fire. Hydrography can limit the availability of naval gunfire support. Weather and terrain can enhance or degrade nuclear and chemical weapons effects.

3.1.4 Situational Factors

This subparagraph discusses possible effects upon unit capabilities of situational factors such as unit status.

3.1.4.1 Communications. Heavy communications traffic will necessitate prioritization of message traffic, resulting in time delays of message transmission. Unit capability in a chemical or nuclear environment will be degraded because of [personnel stress, fatigue, or] the requirement to operate in MOPP. [Communications will be interrupted by EMP and TREE.]

3.1.4.2 Delivery of Fires. Capability to provide naval gunfire support may be affected by status of the supporting ships which can be degraded as a result of prior attack. Operations can also be restricted in contaminated areas. Unit capability in a chemical or nuclear environment will be degraded because of [personnel stress, fatigue, or] the requirement to operate in MOPP.

3.1.5 Effects from Other Functional Areas

[The supply of ammunition and fuel, maintenance, end item replacement and personnel replacement are Navy CSS functions; they must either be implicitly assumed or modeled directly.]

3.2 Functional Representation

3.2.1 Control Units

3.2.1.1 Naval Gunfire Officers (NGFO). NGFO at maneuver brigade or division level, in coordination with the FSE at that level, have the capabilities of fire support planning and communications. Planning is done with the FSE and is discussed under field artillery. The assets for communication between the NGF and DS or GS ships are HF radios and personnel.

3.2.2 Action Units

3.2.2.1 Ships (general or direct support). The primary capability is the delivery of fire.

The assets which are utilized in fire delivery are naval gunfire spotters, ship weapons and ammunition, fire direction centers, and communications equipment.

The delivery of fires are initiated by orders to execute planned fires or by immediate requests for fire. Reports are made from the ships through NGF channels to the requester indicating that missions have been fired.

APPENDIX VI

AIR DEFENSE FUNCTIONAL AREA REPRESENTATION OBJECTIVES

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1.0 AIR DEFENSE FUNCTIONAL AREA REPRESENTATION OBJECTIVES

Figure VI-1 depicts units and the general information flow lines described. The ACC (Airspace Coordination Center) and CRC (Control Reporting Center) of the Air Force, shown within dotted lines on the figure, are included only to show an information line; they are not intended for explicit modeling.

1.1 Standard Effects

In modeling the functional area of air defense, the effects of performing air defense tasks must be considered as well as outside effects on the function. Most of these effects are general to air defense rather than specific to a particular echelon or unit; these standard effects are presented here, organized by action or control unit capability within these five categories:

- Effects of executing the capability on the enemy (targets), on the environment, and on assets
- Effects of combat on the capability
- Effects of the environment on the capability
- Situational factors
- Effects from other functional areas

1.1.1 Effects of Executing the Capability on Targets, the Environment, and Assets

This section describes the effects of performing the capability on enemy targets, on the surrounding environment, or on the performing unit's own assets.

1.1.1.1 Planning and Situation Assessment. Execution of this function has no direct, significant effects on targets, the environment, or friendly assets, except that the staff, as assets, are in use.

1.1.1.2 Communications. Execution of this function also has no direct significant effects, except that the staff and communications links are in use.

1.1.1.3 Delivery of Fires. Delivery of fires is the most important function, since it most directly accomplishes the purpose of defending maneuver forces against air attack and denying the enemy use of airspace.

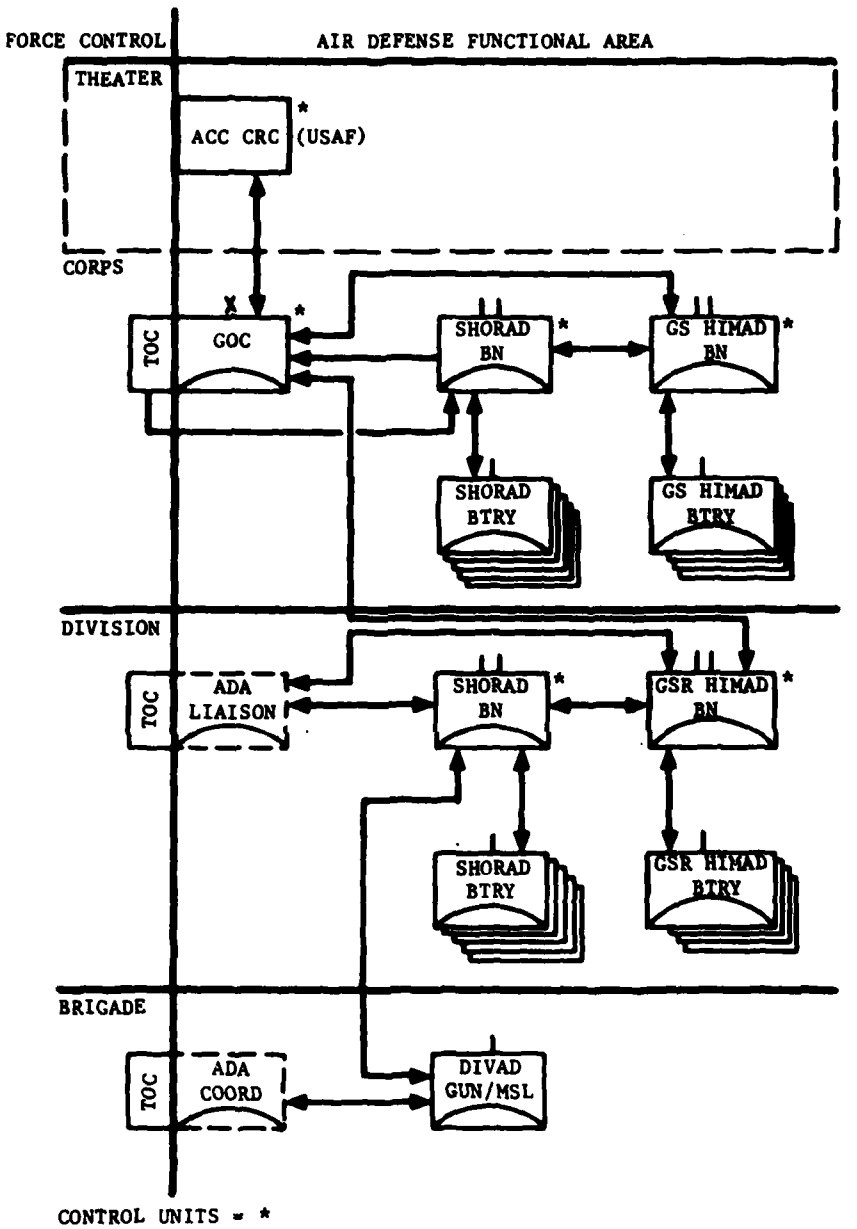

FIGURE VI-1
AIR DEFENSE FUNCTIONAL AREA

Therefore, this function produces the greatest number of effects, which include the following:

- Destruction or degradation of enemy aircraft in direct support, interdiction, RECCE, and sensor roles, and less frequently, the destruction or degradation of ground targets by DIVAD guns
- Consumption of ammunition and POL
- [Operational degradation of weapons and equipment caused by repeated firing, which can result in delays for repair or replacement]
- [Fatigue and stress on personnel]
- [POL used while firing (idling)]

1.1.1.4 Movement. Movement of air defense units causes consumption of POL which can result in a low POL supply. Movement also results in operational degradation of vehicles.

1.1.2 Combat Effects on the Capability

This section addresses the effects of enemy activity on the performance of capabilities.

1.1.2.1 Planning and Situation Assessment. A control unit's ability to detect enemy aircraft and plan their destruction can be seriously impaired by the destruction or degradation of computers and radars by enemy air or artillery attack, especially nuclear attack (blast and EMP effects); the loss or degradation of entire C^2 nodes through nuclear or other attack; the degradation of performance by specially trained personnel due to [stress, fatigue], MOPP (Mission Oriented Protective Posture), or radiation sickness; personnel casualties; [difficulty in chemical decontamination of electronic equipment because water cannot be used]; and jamming of radars.

1.1.2.2 Communications. Communications can be disrupted by destruction of equipment from air or artillery attacks; the loss or degradation of communication nodes through nuclear or other attacks; degradation of performance of specially trained personnel due to [stress, fatigue], MOPP, or radiation sickness; personnel casualties; and jamming of communications equipment.

1.1.2.3 Delivery of Fires. The delivery of fires can be adversely affected by enemy activities in several major ways. Air or ground attacks can destroy launchers and radars; jamming can render the weapon's guidance radars useless; [stress, fatigue], MOPP status, and radiation sickness can degrade firing capability; suppression attacks by the enemy will degrade firing capability; nuclear contamination of weapon systems can delay firing. [Chemical decontamination of electronic components is difficult because water cannot be used. This difficulty can cause firing to be delayed.]

1.1.2.4 Movement. The movement of friendly air defense forces can be affected by enemy activity in two ways. Interdiction can slow or divert movement. Heavy ground combat and the resulting congestion of the battlefield can impede the movement of air defense units.

1.1.3 Environmental Effects on the Capability

This section addresses the effects of weather, daylight, and terrain, and environmental changes caused by enemy and friendly actions.

1.1.3.1 Planning and Situation Assessment. [Electronic equipment operation may be degraded by electromagnetic pulse (EMP) or transient radiation effects on electronics (TREE).]

1.1.3.2 Communications. [Atmospheric conditions such as electrical storms can degrade the usefulness of radios as can EMP or TREE.]

1.1.3.3 Delivery of Fires. Delivery of fires will be less intense during periods of inclement weather because fewer enemy aircraft will be flying. Additionally, ambient light conditions can affect the visual tracking systems of the Chaparral, Stinger, and DIVAD units.

1.1.3.4 Movement. Inhospitable terrain, such as mountains, swamps, rivers, deserts, or jungles, as well as man-made obstacles such as minefields and a nuclear or chemical atmosphere caused by enemy or friendly forces, can slow the pace of movement; inclement weather can postpone or prevent movement by air and slow the pace of ground movement. Frozen ground can enhance cross country mobility.

1.1.4 Situational Factors

This section lists the situational factors which are significant in the air defense functional area.

1.1.4.1 Planning and Situation Assessment. This capability depends on the availability of accurate, timely information and will be affected by the operational status of the control unit's computers. [The availability of personnel with critical military occupational specialties (MOS's) will also have an effect on the performance of this capability.]

1.1.4.2 Communications. In a fast-paced combat situation with heavy communications traffic, available equipment and personnel will be taxed beyond their ability to perform. When this occurs, control units will experience throughput delays in the receipt or transmission of orders and information. [The availability of communications personnel with critical MOS's is also a factor in performance.]

1.1.4.3 Delivery of Fires. There are five situational factors affecting the delivery of fires: a low ammunition status restricts firing; most weapons cannot fire while moving. (Weapons that can fire while moving include the man-portable Stinger, and the DIVAD gun); the current weapons control status can restrict firing; firing is confined to assigned sectors of fire and Primary Target Lines (PTLs) except for self-defense; the operational status of weapons affects the action unit's ability to fire; and [the availability of personnel with critical MOS's will affect performance].

1.1.4.4 Movement. A low petroleum, oil, lubricants (POL) status will restrict a unit's movement, as will degraded operational status of vehicles.

1.1.5 Effects from Other Functional Areas

This section addresses the significant dependencies of the air defense functional area on other functional areas - maneuver control, combat service support, intelligence/electronic warfare, and fire support.

1.1.5.1 Planning and Situation Assessment. Air defense forces depend on the combat service support functional area for repairs and personnel replacement; these are provided through Corps Support Command (COSCOM) and Division Support Command (DISCOM) units, as well as through other sources, such as the Air Defense Command. If these are unavailable, the command and control staff will be less efficient in performing the function of planning and situation assessment.

1.1.5.2 Communications. The effects from other functional areas on the communications function are the same as those on planning and situation assessment.

1.1.5.3 Delivery of Fires. Delivery of fires is adversely affected by lack of COSCOM or DISCOM ammunition resupply, [specially trained personnel replacement], [and weapons repair or replacement], all of which are the responsibility of the combat service support functional area.

1.1.5.4 Movement. Movement in the air defense functional area is affected by the activities of combat service support and maneuver control. COSCOM and DISCOM provide air defense units with POL supply [and vehicle repair], both of which can affect a unit's ability to move efficiently. In the area of maneuver control, engineer support from the combat support subfunctional area will aid air defense units in breaching man-made obstacles or adverse terrain.

1.2 Functional Representation

This section will discuss the actual workings of air defense units - those processes which are significant in a functional area representation.

These units are divided into control units and action units based on their major purposes. Each unit is discussed in terms of the processes it performs; however, since control units and action units perform different processes, it is necessary to treat them in slightly different ways.

First, the control units are described by their capabilities of planning and situation assessment, communications, and command and control. For the first two of these capabilities, the text covers assets used and effects, most of which are the standard effects covered in section 1.1. For command and control, the range of decisions made by the unit and the considerations used in making the decisions, and information feedback to higher control units are discussed.

The action units are then described by their capabilities of delivery of fires and movement. As with the control units, the text covers assets and effects; however, the text for action units also includes a description of the actual execution of the capability, outlining triggering events and information feedback. Section 1.2.1 covers the corps, section 1.2.2 the division, and section 1.2.3 the brigade.

1.2.1 Corps

1.2.1.1 Corps Control Units

1.2.1.1.1 ADA Group Operations Center (GOC)

Planning and Situation Assessment - In performing its capability of planning and situation assessment, the GOC has as its assets the GOC staff and its Missile Minder computer system. At this level, the Missile Minder is used to connect Army air defense with the Air Force's Control and Reporting Center (CRC).

The effects on this capability are standard, with the addition of the combat effect of computer downtime caused by degradation or destruction of the power supply. The units upon which the GOC depends for availability of information are the Air Force CRC and the Corps Tactical Operations Center (CTOC).

Communications - In performing its capability of communications, the GOC uses the GOC staff and communications links.

Command and Control - In exercising its command and control capability, the GOC makes the following range of decisions:

- Imposition of more restrictive weapons control status
- Assignment of missions to the GSR and GS HIMAD battalions, and the SHORAD battalion at corps
- Assignment of sectors of fire and PTL for the GS HIMAD battalion

In making these decisions, the GOC considers the following information:

- Defense Readiness Conditions (DEFCON's) from the airspace coordination center at the Air Force theater level. These are states of readiness to be assumed by all forces within a theater in order to provide a progressive buildup of forces before the outbreak of hostilities; plans of subordinate headquarters contain requirements for actions to be taken corresponding to each DEFCON.

- Air defense warnings from the airspace coordination center at the Air Force theater level. An air defense warning includes the probability and probable time of an attack:

  Red - attack imminent or in progress
  Yellow - attack probable
  White - attack not probable at this time

- Weapons control status from the airspace coordination center at the Air Force theater level. Weapons control status may be weapons free (fire at any aircraft not identified as friendly), weapons tight (fire at only those aircraft identified as hostile according to current hostile criteria), and weapons hold (fire only in self-defense).

- Friendly aircraft information and maneuver unit plans from the Corps TOC

- Reports on unit operational status and progress of the air battle from the GS and GSR HIMAD BOC and the SHORAD BN TOC at corps
- Early warning from the Air Force CRC

- Target information from the Missile Minder computer system (from the Air Force's Control and Reporting Center (CRC))

Information feedback consists of unit status reports from the GOC to the CTOC.

1.2.1.1.2 GS HIMAD Battalion Operations Center (BOC)[1]

Planning and Situation Assessment - In this capability, the GS HIMAD BOC uses the BOC staff; its intelligence section, which provides information on the air and ground situation; and its Missile Minder computer system, which provides target detection and tracking as well as weapon assignment.

Communications - The assets which the GS HIMAD BOC uses for communication include the BOC staff and communications links.

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[1] For modeling purposes, GS HAWK BOC could be considered a C^2 asset of the GOC for CORDIVEM MOD II.

Command and Control - The GS HIMAD BOC is involved in the following range of decisions:

- Tasking of HIMAD firing units (through the battery headquarters)
- Planning and ordering the movement of the GS HIMAD battery and firing units
- Assignment of targets to the firing units (through the battery headquarters)
- Planning HIMAD defenses in support of SHORAD air defense plans

In making these decisions the GS HIMAD BOC considers the following information:

- Its mission, fire control orders, and air defense information received from the GOC
- Unit and equipment status reports and air battle results received from the GS HIMAD batteries
- Target information from the Missile Minder computer system
- Information on the ground and air situation provided by its intelligence section

Information feedback includes reports on unit operational status and progress of the air battle, sent to the GOC.

1.2.1.1.3 SHORAD BN TOC (Tactical Operation Center)[1]

Planning and Situation Assessment - The asset for this capability is the TOC staff.

Communications - The assets used in performing this capability are the TOC staff and communications links.

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[1]For modeling purposes, the SHORAD BN TOC can be considered as a C^2 asset of the GOC. The GOC could pass PTL and sectors of fire to SHORAD action units.

Command and Control - The decisions made by the SHORAD BN TOC are planning and ordering movements for its batteries and firing units, and establishing sectors of fire and PTL for SHORAD weapons.

In arriving at these decisions, the SHORAD BN TOC considers the following information:

- Information on enemy and friendly aircraft, supplied by the GS HIMAD BOC
- Its mission and fire control orders, received from the TOC
- Reports of location and unit situation status from the SHORAD batteries
- Reports of equipment status from the SHORAD platoon and FAAR platoon through the SHORAD batteries
- Reports of engaging a target or sighting a target which was not engaged, from the SHORAD squads or Stinger teams.

Information feedback includes reports on unit operational status and progress of the air battle, sent to the GOC.

1.2.1.2 Corps Action Units. The action units presented here are the HIMAD battery and the SHORAD battery. Squads, platoons, and sections are not treated separately as action units, but are represented as assets of their respective batteries.

1.2.1.2.1 GS HIMAD Battery

Delivery of Fires - The assets which the GS HIMAD battery uses for delivery of fires are its firing units, communications equipment, HAWK/PATRIOT missiles,[17] HAWK/PATRIOT launchers, Information Coordination Center (ICC), tracking radars (High Powered Illuminating radar (HPI)) and Range Only Radar (ROR) when the HPI is being jammed, acquisition radars (Pulse Acquisition radar (PAR) and Improved Continuous Wave Acquisition Radar (ICWAR)), [and its specially trained personnel].

The events which cause delivery of fires to occur include the following:

- The GOC determines sectors of fire and PTL for HIMAD weapons and transmits them to the BOC; the BOC passes them on to the battery.

- The GS HIMAD battery receives its target assignment from the GS HIMAD BOC, identifies the target as hostile, then passes the target assignment on to the appropriate firing unit.

- The HIMAD battery does target acquisition and tracking with its own radars.

The HIMAD battery reports on its mission results and the progress of the air battle to the GS HIMAD BOC.

Movement - The assets which the HIMAD battery uses for movement are its vehicles and communications personnel.

The fire units of a HIMAD battery move when the battery is ordered to move by the HIMAD BN TOC or when movement is necessary for self-protection. When the battery has moved, it reports its new location to its BOC.

1.2.1.2.2 SHORAD Battery

Delivery of Fires - The assets which the SHORAD battery uses in delivery of fires are the SHORAD platoon and squad; the FAAR platoon and section; the Stinger section and team; missiles (Chaparral, and Stinger[1]), FAAR radars; [its specially trained personnel], and communications equipment.

Delivery of fires is initiated at the squad level, when the SHORAD squad leader or Stinger team leader authorizes engagement, based on hostile criteria and visual confirmation; he is influenced in making this authorization by the sectors of fire and PTL established by the SHORAD BN TOC and the alerting from the FAAR section.

At the completion of the mission, the SHORAD battery reports its mission status to the SHORAD BN TOC.

Movement - Movement of a SHORAD battery requires vehicles and personnel.

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[1]Stinger is man-portable.

Movement of a SHORAD battery is precipitated by an order to move from the SHORAD BN TOC or by the battery's own judgment of a need to move for self-protection. When the battery has closed to its new position, it reports the new location to the SHORAD BN TOC.

1.2.2 Division

1.2.2.1 Division Control Units

1.2.2.1.1 GSR HIMAD BOC

Planning and Situation Assessment - The assets which the GSR HIMAD BOC uses in carrying out its planning and situation assessment are the BOC staff; its intelligence section, which provides information on the ground and air situation; its Missile Minder computer system, which processes target detection and tracking and makes weapon assignments; and its radars - HPI, ROR, PAR and ICWAR.

Communications - The assets used in communications are the BOC staff and communication links.

Command and Control - In exercising its command and control capability, the GSR HIMAD BOC makes these decisions:

- Planning and ordering the movement of its batteries and firing units
- Tasking HIMAD firing units, through the batteries
- Assigning targets to firing units
- Planning HIMAD defenses in support of SHORAD ADA plans

The information needed in making these decisions comes from five sources, 1) the GOC, which provides the BOC with its mission, fire control orders, and target information; 2) the TOC of the division[17] that the HIMAD battalion is reinforcing, which informs the HIMAD battalion of its initial task organization and disposition of ADA units, the status of other ADA units in the area, and sectors of fire and PTL for HIMAD weapons; 3) the DTOC, which reports friendly and enemy aircraft information; 4) the GSR HIMAD BOC's internal sources, which include its Missile Minder computer system and its intelligence section for information on the ground and air situation, and 5) the GSR HIMAD battery, which reports its location as well as its unit and equipment status.

Information feedback includes reports on unit operational status and progress of the air battle, sent to the GOC.

1.2.2.1.2 SHORAD BN TOC

Planning and Situation Assessment - The asset used in carrying out this capability is the TOC staff.

Communications - Communications assets used by the SHORAD BN TOC are its staff, and a division multichannel system terminal (12-channel).

Command and Control - The decisions for which the SHORAD BN TOC is responsible are the following:

- Planning and ordering the movement of its batteries, based on the current DEFCON
- Establishing sectors of fire and PTL for each HIMAD SHORAD, and DIVAD Gun/Missile weapon in its area
- Advising the division commander on air defense priorities

In making the above decisions, the SHORAD BN TOC considers information from several sources: the GSR HIMAD BOC sends long range early warning as well as enemy and friendly aircraft information; DTOC sends a more restrictive weapons control status when necessary, information on the division mission and air defense needs, the criticality of the assets it is to defend, and airspace plans; [DIVARTY sends artillery plans, status, and activities]; the SHORAD and FAAR platoons send equipment status reports; the SHORAD battery sends unit status and location reports; the DIVAD Gun/Stinger battery sends a unit status report; and the SHORAD squad or Stinger team sends a report of engaging and/or sighting a target through the SHORAD battery.

Since the SHORAD BN is organic to the maneuver division, its information feedback to higher control units consists of reports to the DTOC on unit operational status and the progress of the air battle.

1.2.2.2 Division Action Units. The Division action units represented here are the GSR HIMAD battery and the SHORAD battery. Squads, platoons, and sections are represented as assets of the battery.

1.2.2.2.1 GSR HIMAD Battery

Delivery of Fires - The assets that the GSR HIMAD battery uses for this capability are its firing units, communications equipment, HAWK/PATRIOT[17] missiles, HAWK/PATRIOT launchers, ICC, tracking radars (HPI, or ROR when HPI is being jammed), acquisition radars (PAR, ICWAR), [and its specially trained personnel].

Events which cause delivery of fires to occur include the following:

- The GOC determines sectors of fire and PTL for HIMAD weapons and transmits them to the BOC; the BOC passes them on to the battery.
- The GSR HIMAD battery receives its target assignment from the GSR HIMAD BOC, identifies the target as hostile, then passes the target assignment on to the appropriate firing units.
- The GSR HIMAD battery conducts target acquisition and tracking with its own radars.

The GSR HIMAD battery reports on its mission results and the progress of the air battle to the GSR HIMAD BOC.

Movement - The assets which the GSR HIMAD battery uses in its movement are its vehicles and personnel.

Fire units of the GSR HIMAD battery move when the battery is ordered to move by its BOC, or when movement is necessary for self-protection. When the battery has moved, it reports its new location to its BOC.

1.2.2.2.2 SHORAD Battery

Delivery of Fires - Assets used by the SHORAD battery in the delivery of fires include its [specially trained personnel]; SHORAD platoon and squad; FAAR platoon and section; Stinger section and team; missiles (Chaparral and Stinger); and communications equipment.

Movement - The assets used in moving are vehicles and personnel.

Fire units of the SHORAD battery move when the battery receives a movement order from the BOC, or when movement is necessary for self-protection. When it completes its move, the battery reports its new location to its TOC.

1.2.3 Brigade

The typical air defense unit supporting the brigade level is the DIVAD Gun/Stinger battery, an action unit. Command and control of this unit is accomplished by the SHORAD BN TOC and the maneuver brigade TOC.

1.2.3.1 Brigade Control Units. There are no air defense control units to be considered at this level.

1.2.3.2 Brigade Action Units

1.2.3.2.1 DIVAD Gun/Stinger Battery

Delivery of Fires - The assets used by the DIVAD Gun/Stinger battery in its delivery of fires are the DIVAD Gun/Stinger platoon and squad, DIVAD gun and Stinger missile systems, communications equipment and [specially trained personnel].

A DIVAD Gun/Stinger battery can fire when a hostile target is identified visually; the SHORAD BN TOC provides sectors of fire and PTL as well as alerting and target location. In addition, a ground force threat will trigger direct fire use of DIVAD Gun/Stinger weapons.

Movement - The assets used for movement are vehicles and personnel.

A DIVAD Gun/Stinger battery moves when the brigade TOC informs it of the relocation of the maneuver unit it is supporting, or when movement is necessary for self-protection.

When relocation is completed, the DIVAD Gun/Stinger battery reports its new location to the brigade TOC.

APPENDIX VII

COMBAT SERVICE SUPPORT FUNCTIONAL AREA REPRESENTATION OBJECTIVES

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1.0 COMBAT SERVICE SUPPORT FUNCTIONAL AREA REPRESENTATION OBJECTIVES

Figure VII-1 is a representation of the connectivity relationships among the combat service support control units and action units considered here.[10,11,35,26]

The activities of the combat service support functional area can be considered in terms of the capabilities of the control units and action units. The primary capabilities of combat service support control units are those of control units in other functional areas - planning and situation assessment, communications, and command and control (C^2). The seven capabilities of combat service support action units are generally peculiar to that functional area, and are described below.

POL Supply

Bulk POL travels from the theater to the COSCOM's POL Supply Battalion by pipelines or bulk carriers. The Transportation Medium Truck Company of COSCOM's POL Supply Battalion then transports it to Class III supply points in the division and brigade support areas (unit distribution), or tankers from DISCOM's Supply and Transport BN tankers go to the corps area to pick up the POL and transport it to the Class III distribution points in the division support area (supply point distribution).[35]

From the division Class III supply point, DISCOM tankers take the POL to Class III distribution points in the brigade support area. Here again, either supply point or unit distribution may be used: the using unit may travel to the direct support unit/brigade supply point, or vehicles of the direct support unit/brigade supply point may take the POL to the user.

Under the Direct Support System (DSS), packaged POL may be shipped directly from CONUS to the direct support unit (supply company).

Supported units in the division area submit periodic POL requests through their S4 to the Division Materiel Management Center; the DMMC sends a replenishment request to the COSCOM MMC. Large stocks of POL are not normally kept at distribution points; POL is resupplied as needed.

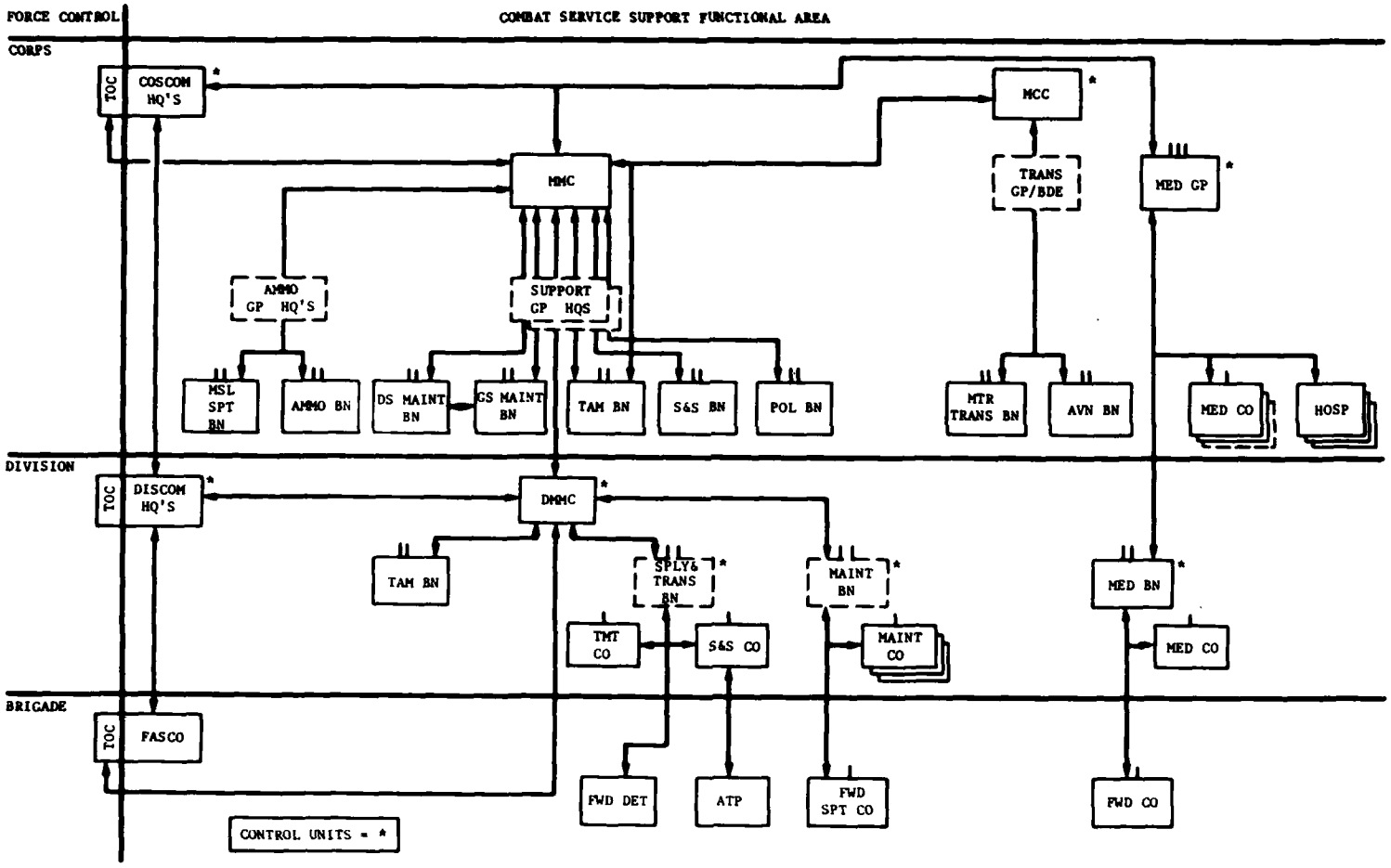

FIGURE VII-1
COMBAT SERVICE SUPPORT FUNCTIONAL AREA

Ammunition Supply

Ammunition supply is primarily a function of the COSCOM. Ammunition is shipped from CONUS to the ammunition supply points (ASP's) in the corps and division support areas in three ways: 1) from CONUS to corps storage areas (CSA), then to the ASP's; 2) from CONUS to theater storage areas, then to the ASP's; or 3) from CONUS directly to the ASP's.[35] The first method is the one generally used; when the tactical situation permits, ammunition may be moved by the second or third method to bypass intermediate points and reduce handling. The Supply and Service Company of the division Supply and Transportation BN also operates supply points in the brigade area; these are termed ammunition transfer points (ATP's).

Generally, supply point distribution is used from the ASP's; using units in the division and brigade areas present their requests to the Division Materiel Management Center (DMMC) for validation, then proceed, in their own trucks, to the ASP/ATP to pick up ammunition. Like POL, ammunition is not normally stocked in large quantities at the supply points; it is resupplied as needed, within the controlled supply rate (CSR) as announced by tactical commanders and the ammunition allocation as announced by the corps commander.

Corps Field Storage Locations (FSL's) supply nuclear ammunition to special ammunition supply points (SASP's), which, upon presentation of proper authorization, supply the using units in the corps and division areas.

Maintenance

There are three types of maintenance service - general support, direct support, and organizational. General support is the highest level of maintenance support and handles the overflow from direct support units; direct support is provided to specific units as a backup for organizational maintenance; and organizational maintenance is that which is performed by the using units.

Maintenance services covered in this paper are concerned with equipment other than COMSEC, Automatic Data Processing Equipment (ADPE), medical, airdrop equipment, light textiles, and explosives. The Division Data Center (DDC) repairs ADPE organic to the DISCOM.

COSCOM units perform general support, direct support, and organizational maintenance. The General Support Maintenance BN services items which could not be quickly repaired by COSCOM's Direct Support Maintenance BN and DISCOM's Maintenance Companies (the repairs generally take 72-96 hours); the Direct Support Maintenance BN services items which could not be repaired by corps-level using units; organizational maintenance is done when possible for combat service support units by the units themselves. COSCOM AVIM (Aviation Intermediate Maintenance) companies provide backup aviation for corps and division AVUM (Aviation Unit Maintenance) units, at corps or on-site by maintenance support teams.

DISCOM units perform direct support and organizational maintenance. The Maintenance Battalion services items which could not be repaired by using units, usually completing repairs within 24-36 hours. [In addition, the Maintenance Battalion maintains a repair parts stock for its own use and for supported units.] Aircraft maintenance for the division and brigade is performed by the DISCOM; the DISCOM's AVIM unit is the Transportation Aviation Maintenance Battalion, which backs up the division's AVUM units.

Personnel Replacement

Personnel replacement detachments of COSCOM coordinate with the Movement Control Center (MCC) for transportation to the new unit. This transportation is usually provided by the Transportation Composite Group/Brigade with its Motor Transport Battalion and Aviation Battalion.

Medical Care

Corps-level medical care includes the evacuation of patients from division level clearing stations and their hospital treatment; further evacuation to Communications Zone (COMMZ) hospitals is provided by the Medical Command (MEDCOM) at theater.

Responsibilities of division-level medical facilities are [to operate clearing stations for short-term treatment of patients], to evacuate patients from unit aid stations, [and to provide division-wide medical supply]. The support company provides medical support for troops in the division rear area, while the forward medical companies support the combat brigades. The medical companies operate clearing stations in the brigade support area, and use ambulances to evacuate patients from maneuver battalion aid stations. In

airmobile divisions, aircraft from the aviation group transport personnel of the medical battalion to brigade or division bases or support areas.

Water Supply

At the corps level, water supply is a function of the maneuver control functional area (combat support); transportation is arranged in coordination with the COSCOM's MCC.

At the division level, water purification and distribution is performed by the Supply and Service Company of the DISCOM's Supply and Transport Battalion. Using units of the division and brigade come to water supply points in their respective support areas for water.

Class VII and Class IV Supply

Supply of major end items and engineer building materials is a function of the General Supply Company and Heavy Supply Company of the COSCOM's Supply and Service Battalion. Supply points may be established in corps and division areas, as needed.

Using units send requests for items to corps headquarters. If the request is approved, corps headquarters directs the COSCOM MMC to release the items; the MMC then instructs the appropriate supply company to issue the items to the using unit.

1.1 Standard Effects

1.1.1 Effects of Executing the Capability on Targets, the Environment, and Assets

Since the combat service support functional area is not concerned with affecting enemy targets, this section describes the effects on the environment and on combat service support assets resulting from the performance of each of the previously discussed capabilities of control and action units. (Command and control is not broken out as a distinct capability here since the effects on command and control are included in the effects on planning and situation assessment and communications.)

1.1.1.1 Planning and Situation Assessment. The only effect of performing planning and situation assessment is that the staff is being used.

1.1.1.2 Communications. The primary effect of communicating is that communications links are loaded.

1.1.1.3 POL Supply. Supplying POL will result in supply depletion at supply points, and an increase of the supply of the users. Transporting the POL causes operational degradation of supply vehicles as well as POL consumption by those vehicles; POL supply traffic increases congestion of roads.

1.1.1.4 Ammunition Supply. The effects of executing ammunition supply are similar to those of executing POL supply - a need for resupply of supply points, operational degradation of supply vehicles, POL consumption of supply vehicles, and increased road congestion from supply traffic.

1.1.1.5 Maintenance. [The execution of maintenance service results in a reduced stock of repair parts at supply units; operational degradation and POL consumption of maintenance team vehicles, and of supply vehicles when they are used to return repaired items to the user; and congestion of roads.]

1.1.1.6 Personnel Replacement. The execution of personnel replacement activities causes operational degradation of vehicles transporting personnel, POL consumption of those vehicles, road congestion, and an increase in the level of personnel at the using unit.

1.1.1.7 Medical Care. Providing medical treatment and evacuation causes [a reduced stock of medical supplies], operational degradation of evacuation vehicles, POL consumption by evacuation vehicles, road congestion caused by those vehicles, and results in personnel being available for duty.

1.1.1.8 Water Supply. Since the water supply is from natural sources and using units are responsible for transporting it, the main effect of water supply of concern here is the operational degradation of purification equipment and pipelines.

1.1.1.9 Class VII and Class IV Supply. Supply of Class VII items (major end items) and Class IV (engineer building materials) causes reduced stocks at supply points, operational degradation of and POL consumption by supply vehicles, congestion of roads, and an increase of repair parts at the using units.

1.1.2 Combat Effects on the Capability

This section describes how the conditions of combat will affect the performance of each of the nine capabilities of control and action units.

1.1.2.1 Planning and Situation Assessment. Command and control nodes are high-priority targets for enemy nuclear attack; for this reason, most of the combat effects on planning and situation assessment are nuclear-related. These effects can degrade the performance of equipment or personnel.

The equipment effects include the loss or degradation of entire command and control nodes through enemy air or artillery attack, especially nuclear attack. The loss of computer hardware, software, or data bases is likely through conventional or nuclear attack [(software and data bases are vulnerable to electromagnetic pulse (EMP) and transient radiation effects on electronics (TREE) in a nuclear environment)]. This loss of automatic data processing function is critical because of the lack of backup manual systems.[35]

Combat effects on personnel include degraded performance due to [stress and fatigue], the difficulty of working in Mission Oriented Protective Posture (MOPP) status, and casualties from blast, radiation, and chemical contamination.

1.1.2.2 Communications. The communications capability is subject to many of the same factors which affect planning and situation assessment: entire communication nodes can be destroyed or degraded through air or artillery attack, especially nuclear; equipment can be destroyed or degraded by air or artillery attack, or jamming; personnel performance can be degraded by [stress, fatigue], the difficulty of working in MOPP status, and combat casualties.

1.1.2.3 POL Supply. Combat effects on POL supply include enemy destruction of supply points, with heavy losses due to nuclear attack; destruction of POL tankers; delay of tankers by combat or by nuclear, biological and chemical, (NBC) contamination; and slowdown of procedures at supply points because of the difficulty of working in MOPP gear. In addition, combat can cause an increased need for POL resupply.

1.1.2.4 Ammunition Supply. The effects of combat on ammunition supply are essentially the same as those on POL supply: supply points, ASPs and SASPs, can be destroyed with heavy losses due to nuclear attack; vehicles

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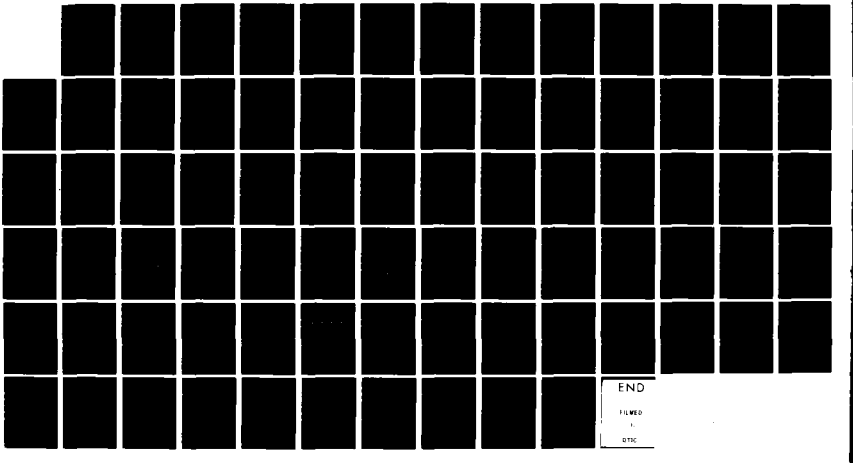

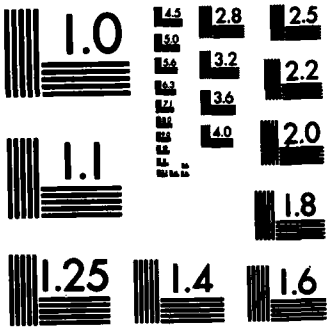

MICROCOPY RESOLUTION TEST CHART
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traveling to or from ASPs and SASPs can be destroyed; vehicles can be delayed by combat in the area; supply can be delayed by nuclear or chemical effects on ammunition or equipment and the resulting need for decontamination; the use of MOPP gear will slow procedures at supply points; and combat can cause an increased need for ammunition resupply.

1.1.2.5 Maintenance. Combat can disrupt maintenance service by causing destruction or chemical contamination of repair parts, vehicles, personnel, tools, test equipment, and items being repaired; service will be impaired if personnel are working in MOPP gear. [In addition to these delays, maintenance service can be made less efficient by the combat loss of trained personnel and the frequent movement of maintenance teams necessary in combat.] Combat will cause an increased need for maintenance service.

1.1.2.6 Personnel Replacement. [Combat will cause an increased need for personnel replacement, especially in a nuclear attack when mass casualties will result; transport of replacements may be interdicted by enemy attack.]

1.1.2.7 Medical Care. Chemical contamination of patients, personnel, supplies, and equipment can cause delay of treatment due to decontamination procedures or working in MOPP gear; this delay of treatment will cause greater loss of life. Enemy attacks can delay or prevent ground and air evacuation of patients; equipment, including ambulances and helicopters, will be destroyed. Efficiency will be reduced by [personnel stress and fatigue], and by the loss of [personnel with highly specialized skills]. Combat will cause an increased need for medical care, especially nuclear attack which causes a large number of casualties, including those from heat and flash.

1.1.2.8 Water Supply. The capability of water supply is susceptible to the combat effects of chemical contamination of water and equipment, and the destruction of that equipment.

1.1.2.9 Class VII and Class IV Supply. Combat effects on Class VII and Class IV supply are similar to those on POL and ammunition supply, that is, destruction of supply points, vehicles, or supplies, and delay of vehicles caused by enemy interdiction.

1.1.3 Environmental Effects on the Capability

This section addresses the effects that factors such as weather, terrain, and nuclear and chemical effects produced by friendly or enemy forces will have on the performance of the capabilities of combat service support units.

1.1.3.1 Planning and Situation Assessment. [Weather conditions such as electrical storms can cause power surge or power failure which will interrupt computer operation.] Environmental effects for which control units must plan include nuclear and chemical effects which alter terrain features, cross country trafficability, and lines of communication.

1.1.3.2 Communications. [Weather conditions such as electrical storms can degrade the performance of radios.]

1.1.3.3 POL Supply. Rough terrain will slow ground movement; icy roads, snow, storms, flooding, and extreme cold will slow ground movement and operations at supply points as well. Tree blowdown, nuclear and chemical effects on supply routes, and the difficulty of retrieving supplies from nuclear "hot" areas will also impede POL supply. Frozen ground will improve trafficability of muddy areas.

1.1.3.4 Ammunition Supply. Rough terrain will slow the movement of supplies to ASPs and SASPs; ice, snow, storms, flooding, and extreme cold will slow operations at the ASPs and SASPs as well. Tree blowdown, nuclear and chemical effects on supply routes, and the difficulty of retrieving supplies from nuclear "hot" areas will impede ammunition supply.

1.1.3.5 Maintenance. Snow and storms will delay movement of maintenance teams, and will increase repair times; rough terrain, flooding, and icy roads will slow movement of maintenance teams and will complicate recovery and evacuation. Frozen ground will improve the trafficability in muddy areas.

1.1.3.6 Personnel Replacement. Rough terrain, icy roads, and flooding will slow the ground transportation of personnel replacements; snow and storms will slow transportation by ground and delay transportation by air. Extremely cold weather will increase casualties due to exposure, thus increasing the need for personnel replacements. Frozen ground will improve trafficability in muddy areas.

1.1.3.7 Medical Care. Casualties due to weather exposure will increase the workload of medical units. Snow and storms will delay or prevent air evacuation of patients, travel of medical teams, and delivery of supplies; rough terrain, icy roads, and flooding will slow evacuation and travel of medical teams by ground as well as ground transport of supplies. Frozen ground will improve trafficability of muddy areas.

1.1.3.8 Water Supply. [Flooding can contribute to contamination of water]; lack of a conveniently located water source will necessitate the use of pipelines or other means of transporting water to distribution points. A nuclear or chemical environment will increase the need for water both for drinking (MOPP gear increases the need for drinking water) and for decontamination.

1.1.3.9 Class VII and Class IV Supply. Rough terrain, icy roads, snow, storms, and flooding all can delay or prevent movement to and from supply units. Nuclear blowdown and nuclear or chemical effects on supply points, vehicles, supplies, and supply routes can delay major end item supply. Frozen ground will improve trafficability of muddy areas.

1.1.4 Situational Factors

This section describes those situational factors such as unit operational status and availablity of supplies or information which affect the performance of the nine combat service support capabilities addressed in this appendix.

1.1.4.1 Planning and Situation Assessment. Planning and situation assessment depend on the availability of accurate and timely information, which is determined in part by the operational status of the unit's computers. [The availability of trained personnel and their level of training are also factors in the performance of planning and situation assessment.]

1.1.4.2 Communications. An excessive amount of communications traffic for the available equipment will degrade performance, as will a reduced operational status of the equipment. [Communication is affected by the availability of trained personnel as well as their level of training.]

1.1.4.3 POL Supply. POL supply is affected by the operational status of the POL supply vehicles, the availability of POL from theater pipelines, and the operational status of supply points.

1.1.4.4 Ammunition Supply. Ammunition supply is affected by the availability of ammunition from theater as well as the operational status of ASPs and SASPs. In addition, the rate of ammunition resupply is regulated by the announced controlled supply rate (CSR) from the tactical commander and the ammunition allocation from the corps commander.

1.1.4.5 Maintenance. Maintenance will be affected by the availability of [trained personnel and their level of training], the operational status of

maintenance team vehicles, [the availability of repair parts], [and the operational status of tools and test equipment].

1.1.4.6 Personnel Replacement. Personnel replacement is chiefly affected by the operational status of vehicles transporting troops.

1.1.4.7 Medical Care. Medical care depends on the [availability of medical supplies and specialized personnel], and the operational status of equipment and hospitals.

1.1.4.8 Water Supply. Situational factors affecting water supply include the operational status of equipment and distribution points.

1.1.4.9 Class VII and Class IV Supply. Class VII and Class IV supply depends on the availability of items and the operational status of supply points, when used.

1.1.5 Effects from Other Functional Areas

The following subparagraphs will describe the ways in which each of the combat service support capabilities can be affected by factors from the other functional areas of fire support, maneuver control, intelligence/electronic warfare, and air defense. Although the combat service support functional area generally supports itself rather than depending on other functional areas, the exceptions are noted here.

1.1.5.1 Planning and Situation Assessment. This capability depends on the availability of information from the division G1, G3, and G4. This availability is a function of the operational status of the G1, G3, and G4.

1.1.5.2 Communications. Communications depends on the signal centers of the maneuver control functional area.

1.1.5.3 POL Supply. There are no significant effects on POL supply from other functional areas.

1.1.5.4 Ammunition Supply. The maneuver control functional area affects ammunition supply in the form of the CSR from tactical commanders and ammunition allocation from the corps commander.

1.1.5.5 Maintenance. There are no significant effects on maintenance from other functional areas.

1.1.5.6 Personnel Replacement. There are no significant effects on personnel replacement from other functional areas.

1.1.5.7 Medical Care. Medical care depends on the availability of aircraft from the Aviation Brigade in the maneuver control functional area (combat support), for airlifting elements of the Medical Battalion to combat areas; and the availability of aircraft organic to the division for emergency evacuation when requested by the Medical Battalion commander (this effect is primarily from the maneuver control area, but may involve any divisional unit).

1.1.5.8 Water Supply. Water supply depends on engineer support from the maneuver control functional area (combat support) for construction of pipelines, when necessary.

1.1.5.9 Class VII and Class IV Supply. Class VII and Class IV supply are not significantly affected by other functional areas.

1.2 Functional Representation

This section addresses the operations performed at each control and action unit by echelon (corps, division, brigade) and unit type (control or action). Each unit will be discussed in terms of its major capabilities; for control units these capabilities are planning/situation assessment and communications, with a description of their associated assets and any non-standard effects, and command and control, with a discussion of the unit's associated range of decisions, considerations used in making those decisions and information feedback to higher control units. For action units, the capabilities are the applicable ones from the previously discussed capabilities, with a discussion of their associated assets, non-standard effects, initiating events and information feedback. Personnel are implicit as assets of the action units.

1.2.1 Corps

1.2.1.1 Corps Control Units

1.2.1.1.1 COSCOM Headquarters

Planning and Situation Assessment - The assets of this unit are its staff and the Automated Data Processing Center (ADPC).

Communications - This unit's assets are its staff, communications links, and its signal center with multi-channel and tactical radios as well as radio teletype (RATT) and wire capabilities.

Command and Control - The COSCOM Headquarters is responsible for developing plans and policies for combat service support to corps units, and recommending priorities of support and allocation to corps headquarters and DISCOM. Both these activities involve coordination with corps and DISCOM commanders.

In particular, the COSCOM Headquartes coordinates reconstitution and Rear Area Combat Operations (RACO) efforts with the Corps Rear CP. The specific tasks involved in reconsitution and RACO -- personnel or unit replacement, and various types of resupply -- are discussed in this appendix under 1.2.1.2 Corps Action Units.

In making these decisions, COSCOM headquarters considers supply, maintenance and transportation information from the MMC and MCC, as well as action unit operational status reports and requests for further evacuation from the Medical Group/Brigade. Information feedback takes the form of reports to the CTOC on CSS unit activities for its use in planning support priorities and allocations.

1.2.1.1.2 Materiel Management Center (MMC)

Planning and Situation Assessment - The assets used by this unit are its staff and the ADPC.

Communications - The assets used are communications links and staff.

Command and Control - The MMC makes decisions in two main areas:

1) It directs the storage and distribution of supplies, coordinating with the MCC for supply transport. This includes ordering issue of Class VII items from available stocks or sending a requisition to CONUS wholesale level, upon receipt of requisition from supported units, and directing POL battalions to release supplies to POL supply companies.
2) It provides tasking to supported maintenance units.

In making the above decisions, the MMC considers requests from using units for Class VII items; direction from corps headquarters to release controlled Class VII supplies; direction and policies from COSCOM Headquarters including the Controlled Supply Rate for Ammunition; requests from the DMMC for additional POL and POL requirement forecasts from POL supply companies; ammunition allocations from COSCOM Headquarters, based on the decision of the corps commander; maintenance and materiel status reports from maintenance battalions, [and requests for backup aviation maintenance for the division, through the DMMC]. Information feedback consists of reports to the COSCOM Headquarters on maintenance activities and supply levels.

1.2.1.1.3 Support Group Headquarters. The DS and GS Maintenance Battalions, the Supply and Service Battalion, and the TAM Battalion belong to one of several support groups. The Support Group Headquarters serves as an intermediate command and control headquarters between these units and the MMC; therefore, it is sufficient to represent the Support Group Headquarters as a control asset of the MMC.

1.2.1.1.4 Ammunition Group Headquarters. The Ammunition Group Headquarters serves as an intermediate command and control headquarters between the Ammunition Battalion and Missile Support Battalion and the MMC; for this reason, it is sufficient to represent the Ammunition Group Headquarters as a control asset of the MMC.

1.2.1.1.5 Movement Control Center (MCC)

Planning and Situation Assessment - The only asset of concern here is the MCC staff; the associated effects are standard, except for the need for coordination with the corps engineer units (combat support in maneuver control).

Communications - The assets used are the MCC staff and communication links.

Command and Control - The MCC's decisions are to coordinate the movement of personnel and materiel [and backup aviation maintenance for the division] with the MMC, and to assign movement tasks to the Transportation Group. In making these decisions the MCC considers unit status reports from corps action units. Information feedback from the MCC includes reports on transportation activities to COSCOM Headquarters.

1.2.1.1.6 Transportation Composite Group/Brigade Headquarters. Although the Transportation Composite Group/Brigade Headquarters is a separate unit from the MCC, it chiefly serves as an intermediate command and control headquarters between the MCC and the Motor Transport and Aviation Battalions; therefore, for the purposes of a modeling effort, it is sufficient to represent the Transportation Composite Group/Brigade Headquarters as a command and control asset of the MCC.

1.2.1.1.7 Medical Group Headquarters

Planning and Situation Assessment - This unit's assets for this capability are its staff.

Communications - The assets of concern here are the staff and communication links.

Command and Control - The decisions made by this unit are in tasking the ambulance companies to perform medical evacuation in the corps and division areas. The Medical Group Headquarters receives requests from supported units in the corps area through the COSCOM Headquarters, or from the division Medical Battalion for medical evacuation of patients to corps medical facilities.

Information feedback includes reports to COSCOM Headquarters on the operational status of medical units and requests for further evacuation to COMMZ hospitals, [provided by the Medical Command (MEDCOM) at theater].

1.2.1.2 Corps Action Units

1.2.1.2.1 POL Supply Battalion

POL Supply - The battalion's assets are personnel, the Petroleum Supply Companies with their supply points, the Transportation Medium Truck Companies, and communications equipment. (There are 2 - 6 Petroleum Supply Companies or Medium Truck Companies, or a combination of the two types.)[26]

The POL Supply Battalion receives POL from theater by pipeline or bulk carriers; when so directed by the MMC, the battalion releases supplies to the POL Supply Company. The Transportation Medium Truck Company delivers the POL to supply points in corps, division, and brigade areas; up to four of these supply points are operated by each Petroleum Supply Company. The

Petroleum Supply Company requests POL through the MMC, and sends unit status reports to the MMC.

1.2.1.2.2 Ammunition Battalion

Ammunition Supply - The assets of the Ammunition Battalion are [personnel], the two Ammunition Supply Companies, with their ASP's (two per company); the Special Ammunition DS Company with its SASP's (two per corps); the FSL's (one for every two SASP's) and communications equipment.

The sequence of initiating events is as follows: ammunition is shipped from CONUS to ASP's or CSA's at corps; using units in the corps and division areas travel in their own trucks to the ASP's or CSA's to pick up the ammunition. The FSL resupplies its two SASP's.

Ammunition supply companies do not report levels of ammunition issue, since they routinely issue the current CSR, determined by the corps commander and transmitted through COSCOM HQ's and the MMC. The Ammunition BN sends unit status reports to the MMC.

1.2.1.2.3 Motor Transport Battalion

Personnel Replacement - The assets of the battalion are [personnel]; its communications equipment, and its Transportation Light Truck Company.

The following is the sequence of events which initiates the combat service support portion of personnel replacement: using units request transportation from the MCC; the MCC notifies the Transportation Composite Group/Brigade Headquarters; the headquarters assigns the transportation task to the Motor Transport Battalion; the Motor Transport Battalion assigns the Light Truck Company the task of transporting personnel to their new units. Information feedback consists of unit status reports sent to the MCC (through the Transportation Composite Group/Brigade Headquarters).

1.2.1.2.4 Aviation Battalion

Personnel Replacement - The assets used are [personnel], the Assault Support Helicopter Company, and communications equipment.

The events which initiate personnel replacement transportation by air are similar to those which initiate personnel replacement transportation by ground: the receiving unit requests transportation through the MCC; the MCC

notifies the Transportation Composite Group/Brigade Headquarters; the headquarters assigns the transportation task to the Aviation Battalion; the battalion tasks the Assault Support Helicopter Company, which transports the personnel. Information feedback consists of unit status reports to the MCC.

1.2.1.2.5 Maintenance Battalion, DS

Maintenance - The assets used are the Headquarters and Headquarters Detachment; three to five maintenance companies, four augmentation teams, assigned to companies as needed; [a stock of repair parts to be used by the battalion or for use in organizational maintenance by supported units]; an Operational Readiness Float of critical end items at each company; [the battalion's personnel]; and communications equipment.

[Maintenance service is initiated by using units in the corps area, which either request on-site maintenance by the augmentation maintenance teams or send personnel to the Maintenance Battalion to exchange non-usable items for usable ones of the Operational Readiness Float.] The Maintenance Battalion sends periodic maintenance and materiel status reports and unit status reports to the ADPC of the MMC.

1.2.1.2.6 Maintenance Battalion, GS

Maintenance - The assets used are the Headquarters and Headquarters Detachment; the maintenance companies (Heavy Equipment GS Maintenance Company or Companies, Light Equipment GS Maintenance Company or Companies, Collection and Classification Company, and Tire Repair Company); the [personnel of maintenance support teams]; and communications equipment.

Unserviceable equipment is evacuated from direct support maintenance units and from supported units in the corps area for direct exchange at the appropriate general support company; or, direct support units and supported units may request on-site repair by maintenance support teams. The Maintenance Battalion sends periodic reports of maintenance and materiel status as well as unit status to the ASPC of the MMC.

1.2.1.2.7 Transportation Aircraft Maintenance (TAM) Battalion

Maintenance - Assets of the TAM Battalion are the Headquarters and Headquarters Detachment; two to eight TAM Companies for intermediate aircraft maintenance and repair parts supply in corps area, as well as backup

maintenance and direct exchange service to DISCOM aircraft maintenance companies; the [personnel in maintenance support teams]; and communications equipment.

[AVUM units organic to the corps request support from maintenance support teams for recovery, cannibalization, and on-site repair of aircraft; supported units in the corps area travel to the TAM Battalion for repair parts. DISCOM aircraft maintenance companies may request backup aviation maintenance from the COSCOM TAM Battalion, through the DMMC to the MMC, to the MCC, then to the TAM BN.] The TAM Battalion sends unit status reports to the MMC, and coordinates with the MCC to determine which AVIM companies will accomplish the repairs, then tasks the appropriate companies.

1.2.1.2.8 Missile Support Battalion

Maintenance - The assets used are [personnel], communications equipment, and three company-sized maintenance units: 1) The Rocket and Guided Missile Maintenance Team for maintenance and repair parts supply service for SHORAD weapons and radars; 2) the Air Defense Maintenance Company for maintenance and repair parts supply service for Improved HAWK and PATRIOT weapon systems and ground guidance systems, and 3) the Pershing Maintenance Company for maintenance and repair parts supply service for one field artillery brigade (Pershing).

Missile maintenance is initiated by supported units in corps areas, which request maintenance service or travel to the Missile Support Battalion for supply of missile-peculiar Class VII items; and [by direct support maintenance companies, which request backup maintenance service, either on-site or at the Missile Support Battalion]. The Missile Support Battalion coordinates with the MMC for maintenance and supply management, and sends unit status reports to the MMC.

1.2.1.2.9 Ambulance Companies (Air and Ground)

Medical Care - The assets used by these units in medical care are aircraft, [personnel], communications equipment, and vehicles. The ambulance companies receive orders from the Medical Group Headquarters to transport patients to corps hospitals; after completing the transport, the companies report the task status to the Medical Group Headquarters. Unit status reports are sent to the Medical Group Headquarters.

1.2.1.2.10 Corps Hospitals

Medical Care - The assets used by the hospitals are the hospitals themselves (one Corps Support Hospital, two Evacuation Hospitals, and one MASH Hospital per supported division), [personnel with critical MOS's], medical supplies and equipment, and communications equipment.

Patients are brought to the hospitals by the ambulance companies; the hospitals send operational status reports to the Medical Group Headquarters, as well as requests for further evacuation to COMMZ hospitals of patients who cannot return to duty within a specified number of days.

1.2.1.2.11 Supply and Service Battalion

Class VII and Class IV Supply - The assets used are the Heavy Materiel Supply Company, the General Supply Company, [personnel], and communications equipment.

Class VII and Class IV supply at the COSCOM level is initiated when the MCC, upon corps approval, directs the appropriate supply company to issue the items to using units in the corps, division, and brigade areas. The Supply and Service Battalion reports to the MMC on its maintenance and materiel status.

1.2.2 Division

1.2.2.1 Division Control Units

1.2.2.1.1 DISCOM Headquarters

Planning and Situation Assessments - The assets used in this capability are the headquarters staff, the Division Data Center (DDC), and the FASCO (Forward Area Support Coordinating Officer).

Communications - The communications assets are the staff, the DDC, communications links and a signal center with multi-channel and tactical radios as well as RATT and wire capabilities.

Command and Control - The DISCOM Headquarters makes such decisions as allocation of POL transportation assets (done by the Movement Control Officer in coordination with the DMMC); and the organization of DISCOM unit movement, in coordination with the division G-4. The DISCOM

Headquarters also coordinates reconstitution and RACO efforts with the Division Rear CP; the specific tasks included in reconstitution and RACO (personnel or unit replacement and various types of supply) are discussed in this appendix under section 1.2.2.2 Division Action Units. Considerations used in making these decisions include policy guidance on transportation movement from the Division Transportation Officer at Division Headquarters, information on the logistics situation in the brigade area from the FASCO (the FASCO coordinates with the brigade headquarters) and information from the Division G-3 and G-4 on the division's tactical plan. Information feedback from the DISCOM Headquarters includes advice to the division commander and G-4 (DTOC) on logistics, advice to the division commander on airdrop operations in airmobile and airborne divisions, and coordination with COSCOM Headquarters.

1.2.2.1.2 Division Materiel Management Center (DMMC)

Planning and Situation Assessment - The assets used are the DLOGS (Division Logistics System) and MRM (Maintenance Reporting and Management System) (automated systems from DDC), computer terminals, and the DMMC Staff.

Communications - The assets used are [trained personnel] and communications links.

Command and Control - Decisions made by the DMMC are to develop authorized stockage lists (ASL), and prescribed load lists (PLL) for supplies; procure and direct distribution of division supplies; authenticate ammunition requests of user units, based on replacement of the basic load and the controlled supply rate from tactical unit commanders; to plan the operation and location of supply distribution points; and to coordinate with the Movement Control Officer at DISCOM Headquarters on POL distribution and personnel transport.

Considerations used in making these decisions include ammunition request from using units, POL needs from using the unit's G-4, and Brigade S4, POL status reports from Class III distribution points, the CSR from tactical commanders, [and requests for backup aviation maintenance from division aviation maintenance companies]. Information feedback includes requests for additional POL through the corps MMC.

1.2.2.1.3 Supply and Transportation BN Headquarters and Maintenance BN Headquarters

Although the Supply and Transportation Battalion Headquarters (or the Supply and Service Battalion Headquarters of the Airmobile and Airborne DISCOM's) and the Maintenance Battalion Headquarters are separate units from the DMMC, they chiefly serve as intermediate command and control headquarters between the DMMC and the Transportation Motor Transport Company, Supply and Service Company, and the Maintenance Companies; therefore, for modeling purposes, it is sufficient to represent these units as command and control assets of the DMMC.

1.2.2.1.4 Medical BN

Planning and Situation Assessment - The staff is the battalion asset for planning and situation assessment.

Communications - The battalion's assets are its staff and communications links.

Command and Control - The decisions for which the Medical Battalion has responsibility include determining which patients should be reported to the Medical Group as needing evacuation to corps hospitals, and tasking the support company and the forward companies. The battalion receives status reports and evacuation requests from the support company and the forward companies. Information feedback from the Medical BN consists of reports of operational status of its units and requests for further evacuation of patients, both of which are sent to the Medical Group at corps.

1.2.2.2 Division Action Units

1.2.2.2.1 Supply and Service Company

POL Supply - The company's assets used in POL supply are [personnel], the POL distribution points in the division and brigade support areas, division POL reserves in the division support area, and communications equipment. The associated effects are standard, with the additional effect from other functional areas of the availability of Air Force aircraft for unit distribution in airmobile divisions.

POL supply is done routinely, and is caused by POL consumption by supported units. The Supply and Service Company requests POL for its

distribution points through the DMMC (Supply and Transportation BN Headquarters) from the MMC. The Supply and Service Company receives daily POL status reports from its distribution points and passes a consolidated report as well as a unit status report on to the DMMC (Supply and Transportation BN Headquarters).

Water Supply - The assets used for water supply are purification equipment, communications equipment, water distribution points in the division and brigade support areas [and personnel].

Water supply is done routinely and is caused by the need for water at supported units; the Supply and Service Company sends reports to the DMMC (Supply and Transportation BN Headquarters) on its operational status and that of its supply points.

1.2.2.2.2 Transportation Motor Transport Company

Personnel Replacement - Vehicles, [personnel], and communications equipment are the personnel replacement assets used by this unit.

Replacement personnel arrive at the Adjutant General Company of the DISCOM, where they are processed and prepared for transport to their new units in the division or brigade areas. This transportation is requested by the receiving units through the DMMC; the DMMC notifies the Supply and Transportation BN, who in turn tasks its Transportation Motor Transport (TMT) Company. The TMT Company sends periodic status reports to the DMMC (Supply and Transport BN Headquarters).

1.2.2.2.3 Maintenance Companies (Light, Heavy, and Missile Support)

Maintenance - Maintenance assets of these companies are [personnel], maintenance support teams, [maintenance parts stock (including missile maintenance parts in the Missile Support Company)], an Operational Readiness Float of usable items, communications equipment, and vehicles.

Maintenance service by the companies is initiated by tasking from the DMMC (Maintenance Battalion Headquarters). The companies send periodic status reports to the DMMC (Battalion Headquarters); in addition, the Missile Maintenance Company may request backup missile maintenance support from the corps Missile Support BN, through the DMMC (Maintenance BN Headquarters).

1.2.2.2.4 Transportation Aircraft Maintenance Battalion (Airmobile DISCOM)

Maintenance - The assets used by this battalion are [its stock of aircraft repair parts received through the COSCOM], aircraft maintenance teams, [personnel], communications equipment, and aircraft for transporting the maintenance teams and for evacuating aircraft that cannot be repaired by the maintenance teams to the division support area.

[Maintenance service is initiated by supported units, who either request on-site maintenance by maintenance teams or bring unusable equipment to the battalion for exchange at the Operational Readiness Float; the battalion returns repaired equipment to the user.] The TAM battalion sends status reports to the DMMC, and may request backup aviation maintenance from the corps TAM BN, through the DMMC and the MCC.

1.2.2.2.5 Medical Support Company

Medical Care - This unit's assets for medical care are [trained personnel], vehicles (including ground transport, air ambulances, and helicopters), [medical supplies], clearing stations for short-term treatment in division and brigade areas, communications equipment, and the Air Ambulance Platoon in airmobile divisions.

Medical care is initiated by tasking from the Medical Battalion Headquarters, and by requests from unit aid stations for evacuation of patients to division clearing stations (this evacuation is done by air in airmobile divisions). The medical support company sends reports on its operational status to the Medical Battalion Headquarters, as well as requests for further evacuation of patients.

1.2.3 Brigade

1.2.3.1 Control Units. There is no distinct support command at the brigade level; brigade units are serviced by units of DISCOM and in some cases COSCOM (e.g., unit distribution of POL). Liaison between DISCOM elements and the brigade is supplied by the FASCO, which is organic to the DISCOM Headquarters. Therefore, there are no combat service support control units of interest at this level.

A group of personnel, vehicles, and equipment operating together to provide combat service support is called a train. Brigade trains consist of the

Brigade S4 section and any organic support units, plus those COSCOM and DISCOM units outlined below.

1.2.3.2 Action Units

1.2.3.2.1 Ammunition Transfer Points

Ammunition Supply - Vehicles, [personnel], and communications equipment are the assets of the ATP's.

The ATP is under the operational control of the DMMC, and thus receives tasking from the DMMC (Supply and Transportation Battalion Headquarters and Supply and Service Company); it passes status information to the DMMC through the Supply and Service Company (and the Supply and Transportation Battalion Headquarters).

1.2.3.2.2 Forward Detachment of Supply and Transport Battalion. Activities are the same as those of the Supply and Service Company at division level, except that brigade units are supported.

1.2.3.2.3 Forward Company of the Maintenance Battalion. Activities are the same as those of the Maintenance Companies at division level, except that brigade units are supported.

1.2.3.2.4 Forward Support Medical Company. Activities are the same as the Medical Company at division level, except that brigade units are supported and patients are evacuated to division clearing stations.

APPENDIX VIII

FORCE COMMAND AND CONTROL REPRESENTATION OBJECTIVES (FC^2RO)

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1.0 STRUCTURE OF THE APPENDIX

This document discusses the four C^2 processes described above by echelons. Figure VIII-1 shows Figure 4 (see section 3.2.1.1 force C^2 processes) successively applied by echelon and command post. As noted in the maneuver control FARO, the corps tactical CP is primarily an alternate headquarters and is not treated here. At brigade, the brigade trains are considered part of the CSS functional area (see CSS FARO) and the use of a brigade tactical CP is at the discretion of the brigade commander. Hence, the brigade main CP is primarily where the force C^2 processes take place. The division and corps rear CPs are considered as part of maneuver control for rear area security, and as part of CSS and maneuver control for force reconstitution.

For each of the four processes, this C^2 FARO lists the purpose, the inputs to the process, the range of decisions made in the process or the scope of the process activity, and the outputs that result from the process. This FARO does not attempt to describe staff processes at the workstation level, but rather crystalizes the four primary C^2 tasks carried out by the command and staff element as a whole.

Because of the time-oriented nature of the battlefield, indications of timing considerations are given for each process.

It should be noted that the plan/order preparation process is discussed primarily in terms of the source of an historical audit trail, since in a model context, it represents mainly a set of time delays (see section 2.4).

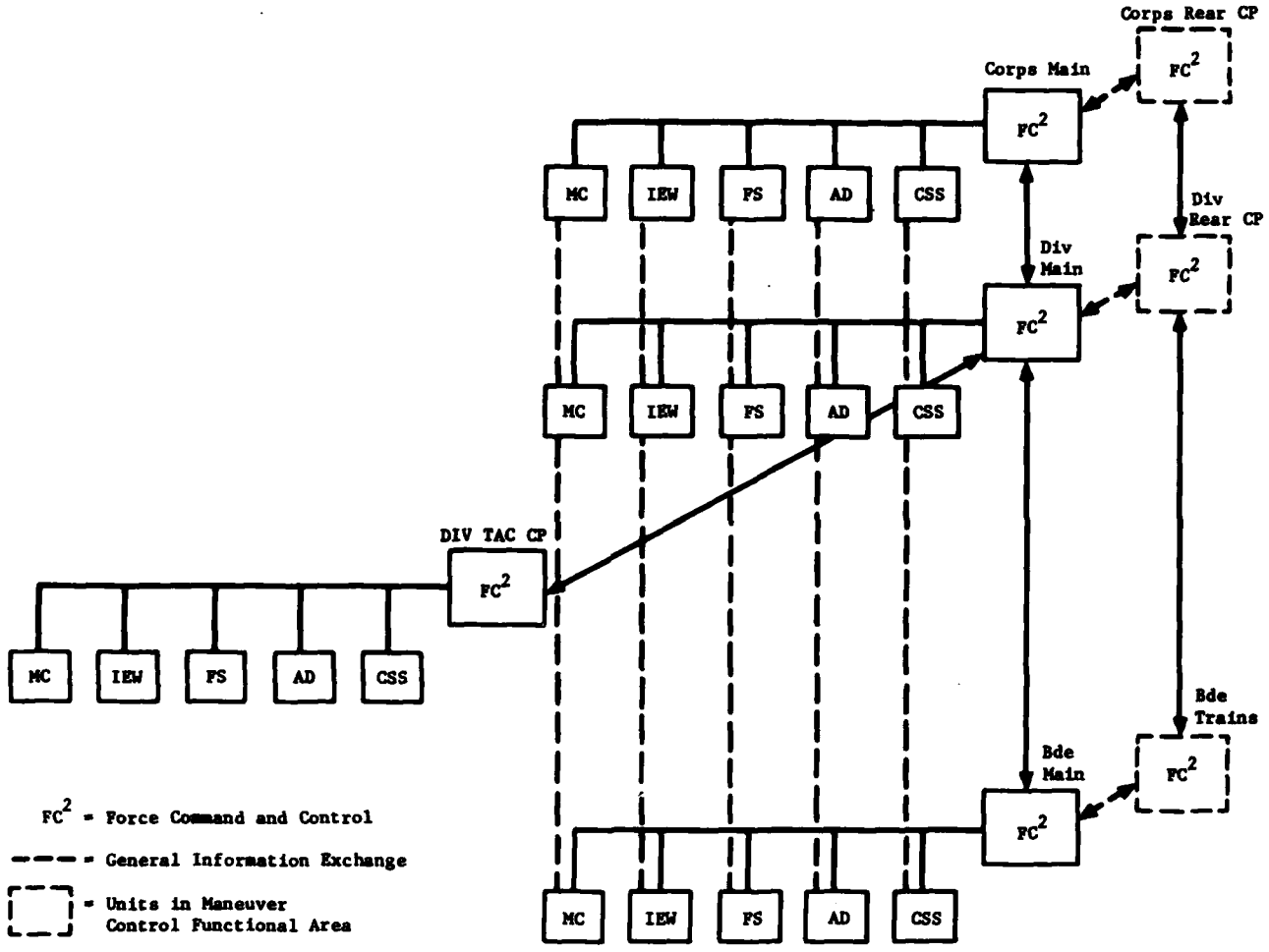


FIGURE VIII-1
ORGANIZATIONAL REPRESENTATION—FORCE CONTROL

2.0 FUNCTIONAL REPRESENTATION

2.1 Monitoring the Current Situation

2.1.1 Purpose

The purpose of this process is to determine the deviations of the perceived current situation from the desired situation. The desired situation is that set of enemy, friendly and environmental states that represent the accomplishment of the mission by the force. Deviations occur primarily from either a) changes in the state of maneuver control activity and/or in the perception of the enemy situation or b) receipt of a change of mission or a new directive from higher headquarters. It is important to note here that each staff element monitors his assigned functional area as described in the FAROs in terms of situation assessment and planning. This section describes the critical items which will initiate the force C^2 processes described in succeeding sections.

2.1.2 Inputs

The inputs to this process are the perceived friendly situation, enemy situation, and the state of the environment. The friendly situation encompasses locations, strengths, and functional capability status of friendly units of the force. The enemy situation consists of locations, strengths, and functional capability status of enemy unit's in the area of interest of the force as well as at least two likely courses of future action. The state of the environment consists of the terrain conditions in the force's area of interest, and the weather conditions for the time lines of concern to the force, and combat induced nuclear and chemical conditions. Areas of interest/influence by hours beyond the front line of troops (FLOT) are:

Echelon	Area of Influence	Area of Interest
Corps	72 hrs	96 hrs
Div	24 hrs	72 hrs
Bde	12 hrs	24 hrs

Information concerning the enemy and environment is obtained primarily from the IEW functional area whereas friendly situation data is obtained from the status reports from all functional areas.

2.1.3 The Monitoring Process

What we define here is the minimum set of deviations to be obtained from this process which will trigger the succeeding force C^2 processes.

2.1.3.1 The Immediate Battle. The range of triggering events that apply to Corps Main CP, Division Tactical CP and Brigade Main CP are:

a. Combat Triggers

- Inability to seize mission objective within mission time lines
- Inability to hold a defensive objective within the mission time lines
- Inability to effect delaying tactics within the mission time lines
- Accomplishment of mission earlier than expected
- Inordinate loss of or increase in combat force superiority in the area of the main attack
- Loss or immobilization of own or enemy's reserve forces
- Unexpected loss of enemy contact in the area of the main attack
- Discovery of enemy diversion while in a defensive posture
- Loss of Corps, Division, or Bde level control units
- Inordinate loss of air defense assets; inordinate enemy loss of air defense assets
- Inordinate loss of main COSCOM or DISCOM Class III or V support units; or the overextension of supply lines of communications; or a similar situation on the enemy side

b. Deep Battle Triggers

- Unsuccessful or indeterminate deep battle interdiction results (Corps)
- Loss of special forces (e.g., separate brigade at corps) used to exploit a deep battle enemy vulnerability
- Completion of deep battle force task (requires extraction)
- Inability to resupply deep battle force

c. General Situation Triggers

- A lateral shift in enemy forces at the regimental level
- Movement of enemy second echelon forces forward
- Loss or reestablishment of air superiority (corps)
- Enemy use of nuclear and/or chemical weapons
- Additions or deletions of units by higher headquarters directives

2.1.3.2 The Future Battle. The range of triggering events for the Corps and Division Main CPs for future operations planning concern primarily new directives or a change in mission from higher headquarters. However, the achievement of the force's primary mission should also give rise to the succeeding force C^2 processes for future operations.

2.1.3.3 Rear Areas. The range of triggering events from the corps and division rear areas are:

a. The decimation of a battalion or battalions in the division or corps zones (reconstitution).

b. Unforeseen enemy attack or attack tactics against rear area positions (rear area combat operations).

2.1.3.4 Execution of Future Plans or Contingencies. Each plan or order in existence at the force headquarters may carry with it missions (goals) to be obtained either subsequent to a previous mission or at a particular point in time. These can be triggering events for the other C^2 processes. Also, contingency plans carry with them the conditions under which a contingency will go into effect. Those conditions are also triggering events (see section 2.4).

2.1.3.5 Periodic Review. We envision as well the need to represent a periodic exercising of the FC^2 processes not triggered by the above described events. This would be similar to the commander's daily staff briefing.

2.1.4 Results

The results of the monitoring process are essentially the reports of the triggering events which are used as inputs to the Identify New Missions process (section 2.2).

2.1.5 Timing

The aspect of timing which is critical here is the flow of situation information from the battlefield. This is an extension of the FARO upward information flows and is detailed in those documents.

2.2 Identification of New Missions or Tasks

2.2.1 Purpose

The purpose of this task is to establish goals for the force to achieve. These take the form of missions defined in space and time. The force commander and his staff also determine what sub-goals must be achieved to obtain this final goal (mission accomplishment).

2.2.2 Inputs

The primary inputs for this function are the deviations of the current situation from the desired situation as identified by the monitoring process.

2.2.3 The Mission Identification Process

The key to this process is identifying not only the explicit missions (goals) but also the implicit missions (subgoals). If the triggering event was a formal operations order or an operations plan from higher headquarters,

explicit missions are normally clearly stated and implicit missions are what must be developed. If the triggering event was a frag order, the primary concern is the specific changes to an already implemented operations order. If the triggering event is situationally oriented however, the force C^2 process must identify goals and subgoals from the enemy/friendly/environmental context.

The range of explicit and implicit mission identifications to be made for all echelons are:

- What terrain is to be controlled until when
- What activity is to be conducted until when or until a certain battlefield condition is achieved, e.g., "hold until a passage of lines is completed"
- Destruction or neutralization of what enemy targets by when (corps deep battle)
- Interdict what targets until when
- Protection of what zone until when

The explicit missions (goals) and implicit (subgoals) form a hierarchy that moves the force from the current situation to the desired situation. For each goal that can be expressed in the above terms, there can be subgoals expressed in the same manner; for each subgoal there can be further subgoals. For example, the goal of securing a terrain objective may not be achievable until certain enemy targets are neutralized. That neutralization may in turn depend upon the securing of intermediate terrain objectives.

Figure VIII-2 shows this process. As we understand it today, the C^2 mission identifying process begins at the explicit mission (goal) and asks the question: what can the enemy do to prevent the achievement of that goal? The counter to the answer to that question forms the basis for the subgoals.

2.2.4 Results

The results of the mission identifying process are the terrain/target/time goals and subgoals identified. Additionally, a warning order may be

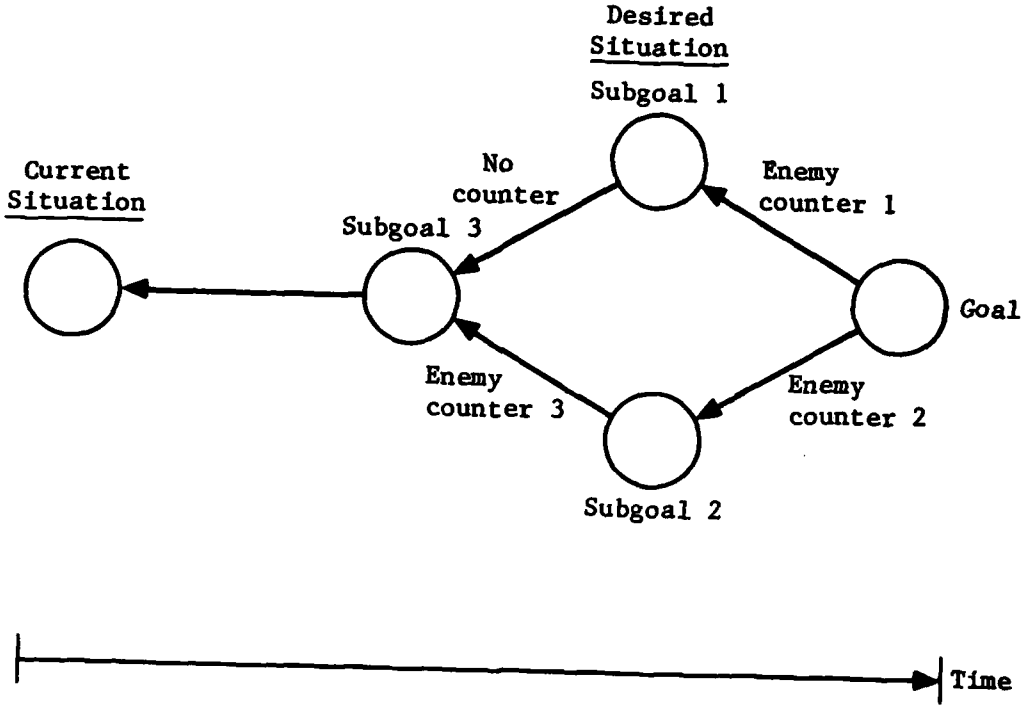


FIGURE VIII-2
GOAL/SUBGOAL CHAIN

issued to lateral and subordinate headquarters as well as to staff functional areas.

2.2.5 Timing

The mission identification process, for purposes of model representation, is virtually instantaneous. Main and rear CPs usually conduct this process more formally than forward CPs, and higher echelons will generally take some small amount of time as well.

2.3 Making an Estimate of the Situation and Selecting a Course of Action

2.3.1 Purpose

The purpose of the situation estimate is to produce viable courses of action with which to carry out the force mission, together with the pros and cons arrayed in a manner that will allow the selection of a course of action.

2.3.2 Inputs

The primary inputs to this process are the perceived enemy/friendly/environmental situation and the mission (goal) identifiers from the previous process.* Of critical importance here is the enemy probable opposing courses of action.

2.3.3 The Estimate Process

2.3.3.1 General. This process consists of identifying at least two alternative ways to carry out the mission, analyzing the enemy opposing courses of action and critical considerations against each alternative and determining the outcomes, and selecting the best course of action. General doctrinal guidelines can be used to identify possible courses of action initially, but the wargaming of these against enemy opposing courses of action will cause the tailoring of a doctrinal approach to an ad hoc situational approach.

2.3.3.2 Enemy/Friendly Comparison. At the division and brigade level and to a lesser extent at the corps level, there is a critical need to establish

*Normally, the commander will issue guidance as well at this point which serves as bounds on the process such as restriction on use of nuclear or chemical weapons.

relative combat power differentials, since these will generally limit the tactics in a given situation. Comparisons should be made in the following categories as a minimum:

- Maneuver forces that can be brought to bear within the mission timelines
- Fire support forces that can be brought to bear within the mission timelines
- Ease of mobility
- Current dispositions and availability of avenues of approach and lines of communications

2.3.3.3 Courses of Action. Courses of action follow from the previous enemy/friendly comparison and are bounded by the given explicit mission. Regardless of the mission type, a minimum set of factors that will differentiate courses of action are:

- The relative weighting of maneuver and fire support assets
- The particular sectors of the near and deep battles designated as the main area of concern (i.e., "main attack in the north")
- Relative emphasis on special tactics such as heavy EW, night operations, or diversionary attacks
- The use of nuclear and/or chemical weapons

2.3.3.4 Risk Analysis. Figure VIII-3 represents a typical matrix for comparing courses of action. A scheme for valuing each intersection of the matrix must be established as well as a method for determining what is "best" (e.g., summation of values or the application of weighting factors). It is important to note that each preceeding processes has contributed to establishing the rows and columns of this matrix.

SIGNIFICANT FACTORS

	Enemy Course of Action 1	Enemy Course of Action 2	•••	Terrain	Weather	Force Availability	POL	Class V
Course of Action 1								
Course of Action 2								
Course of Action 3								
⋮	⋮	⋮	⋮					
Course of Action n								

FIGURE VIII-3
COURSE OF ACTION RISK ANALYSIS

Three elements form the essence of the course of action chosen: the commander's concept, the scheme of maneuver, and the scheme of fire support. However, as one moves from brigade to corps, the emphasis shifts from tactics to force structuring or tailoring. Thus, corps and division commanders are more concerned about concentrating forces at critical points, whereas the brigade commanders concentrate on directing the actual battle.

What follows is the range of decisions actually made which produce the essence of the course of action. After the initial formal operations order is issued, only changes to the basic schemes will normally ensue, i.e., only a subset of the range will be used.

2.3.3.5 Range of Decisions - Corps Main CP

- Assign missions to primary and secondary forces in the terms outlined in 2.2.3
- Determine the organization for combat
  - Composition of the primary force (division, separate brigade and/or deep battle force) in terms of artillery, CAS sorties, maneuver, combat support and CSS
  - Composition of secondary forces and reserves
- Determine use of the ACR as a covering force and for rear area security
- Establish coordination boundaries
- Determine scheme for use of BAI sorties and missile units for the deep battle
- Establish supply rates
- Grant release authority for nuclear and chemical weapons
- Provide guidance for jamming priorities
- Specify essential elements of information to be obtained by IEW functional area
- Establish nuclear/chemical risks
- Reallocate fire support, AD, and CSS resources

2.3.3.6 Range of Decisions - Division Main and Tactical CPs

- Assign missions to primary forces and reserves in terms outlined in 2.2.3
- Determine organization for combat
  - Allocation of Corps forces to brigades and for retention under division control
  - Allocation of divisional units for the near and deep battles
- Establish supply rates
- Establish priority of fire support
- Establish priority of air defense
- Establish priority of combat support
- Determine use of the air cavalry brigade
- Determine rear area security force
- Specify essential elements of information to be obtained by IEW functional area
- Provide guidance for jamming priorities
- Establish nuclear/chemical risks

2.3.3.7 Range of Decisions - Bde Main CP

- Assign mission to each task force in the terms outlined in 2.2.3
- Determine task force organization for combat
  - Cross attachments of combat forces
  - Allocation of divisional units allotted to the brigade
- Establish priority of fire support
- Determine force's ability to carry out assigned mission (request for further orders from higher headquarters)

2.3.4 Results

The results of this process are clearly the decisions the force C^2 process has made. The next process to be described is plans and order preparation, but with most situations concerning the immediate battle, fragmentary orders

are issued, concerning changes to existing operations orders. Depending on the type of change, such orders will be disseminated to any or all of the five functional areas at the echelon of concern, to subordinate force control headquarters, or to the lateral rear area headquarters. Too, in the rare case that the force cannot accomplish the assigned mission, information to that effect as well as requests for further instructions will be passed to the next higher force control headquarters.

2.3.5 Timing

2.3.5.1 Brigade Main CP. The estimate process here is one of controlling and directing the battle. These estimates are short, informal, mostly oral, and usually involve only maneuver control, fire support, and intel/EW staff elements.

2.3.5.2 Division Forward CP. The estimate process here is normally informal as at the brigade main, although because of the division operations timelines, more time can be taken. Often certain CSS staff are involved as well as maneuver control, fire support, and intel/EW.

2.3.5.3 Division/Corp Main CP. Estimates at division and corps main CPs generally are oriented toward planning for future operations based on the success or failure of the current plans and directives from higher headquarters. At corps, a written estimate is usually obtained from each coordinating and special staff officer; these are all collated by the G3 for presentation to the commander.

At division the process is similar but shorter since the estimate is rarely written by staff section at this level.

2.4 Preparation of Plans and Orders

2.4.1 Purpose

The purpose of this process is to produce the instructions that implement the course of action developed and approved in the preceeding process. Staff members also execute the solution to the problem that falls within their area of staff supervision.

From a modeling standpoint, the primary instructions in an OPORD are created in the preceding step and only a time delay for formal order preparation need proceed the dissemination of those instructions to the appropriate functional area or force headquarters.

Plans, however, are instructions to be implemented at a later time or as a result of a foreseen contingency. A time delay is required for their initial preparation, but units in the model need only be aware of their existence prior to the occurence of the situation event requiring their implementation. They include a set of assumptions which outline the conditions under which the plan will go into effect; there is no execution time associated with the plan.

2.4.2 Inputs

The primary input is the course of action chosen from section 2.3.

2.4.3 The Order/Plan Preparation Process

Each staff section concurrently documents their portion of the order or plan and the G3/S3 operations officer collates them and develops an accompanying operations overlay.

2.4.4 Results

This is a documentation process which is essential to a modeling construct. The essential portions of the output for such a model representation are as follows:

- Organization for combat
- Commander's guidance/priority for each functional area, subordinate force control headquarters, and lateral rear area headquarters
- Dissemination scheme and associated time delays
- Summary of courses of action comparisons
- Graphical (overlay) portrayal of the scheme of maneuver
- Plan assumptions

The above list need not be produced at every echelon for each decision process. Depending on the study requirements, only a subset of this information may be required.

2.4.5 Timing

As with making a situation estimate, the time delays associated with plan/order preparations are dependent on the echelon, the command post, and the nature of the operation. Formal plans/orders are rarely issued at the

brigade or at the Division Forward CP. The division and corps main prepare formal orders/plans at the outset of a major campaign, after which frag orders are the status quo or the implementation of a contingency plan.

3.0 TIES TO THE FUNCTIONAL AREA C^2 ELEMENTS

In each of the FAROs developed in earlier documents, control units were identified with the capabilities of situation assessment and planning, and communications. With each control unit was also identified the range of C^2 decisions made and the units to which these decisions were disseminated, the considerations used to make those decisions and the related sources of information, and the information flow to the staff element on the boundary of the functional area and the force control. It is in the sources of considerations and the information flow to the staff element that the connection of the functional area to the force C^2 cap lies.

3.1 Considerations Used In Functional Area C^2 Decision Making

The instructions for the functional area concerned found in the frag order, warning order, or formal OPORD contain what is usually referred to in the FAROs as "commander's guidance" or "scheme of maneuver of the force commander". Items such as organization for combat, priority of fires, and supply rates are examples of the considerations that will trigger or be incorporated in a functional area C^2 process.

3.2 Information Feedback from Functional Area C^2 Elements

The information flow from the functional area C^2 nodes to the boundary staff element form the basis of the process described in section 2.1, Monitoring the Perceived Situation versus the Desired Situation. Examples of such items include action unit status reports, critical supply point status, reports of observed enemy activity (from maneuver control and fire support), estimates of enemy order of battle and significant enemy activity, and changes in air defense weapons status.

4.0 NOTES ON THE PROBLEMS OF IMPLEMENTATION

It is beyond the scope of this effort to present an exhaustive list of the doctrine, tactics, and strategies to be employed in all or even in most situations on the battlefield. The AMIP community must draw upon or produce workstation analyses that will capture a baseline set of doctrine matrices at the outset of a CORDIVEM implementation. Subsequently, the model construct needs to "learn" of additional or improved actions to take in new battlefield contexts in order to be useful for the analysis of force structure tradeoffs and the use of alternative doctrine, tactics, or strategies. Flexibility in a model's capability to incorporate the results of this "learning" is paramount.

Of a more critical nature from the standpoint of state-of-the-art modeling techniques is the process of planning. Once a future battlefield state is forecast, a plan that amounts to a future OPORD can be developed. Yet, it is the method of obtaining that forecast and alternate forecasts (for contingency plans) that is difficult to define. And then the evaluation of force capabilities to cover this range of alternatives is of equal difficulty. Artificial intelligence techniques certainly hold some promise of moving the modeling community a long way toward solving these problems. Nothing will substitute, however, for the arduous task of thoroughly studying the decision/planning processes from all aspects. This type of analysis requires priority support from all areas of the defense analytical community.0

APPENDIX IX

NOTIONAL ORGANIZATIONAL CHARTS

This appendix contains current organizational charts for the functional areas of maneuver control, intelligence/electronic warfare, fire support, air defense, and combat service support, as well as their subfunctional areas. These charts are intended to show structure and command relationships for TO&E units in a 1980 configuration. For a portrayal of structure and information flows used in the FAROs see Figure 1 in section 2.0 of each FARO (Appendices III - VII).

Maneuver Control, Combat

Figure IX-1 shows a notional corps organization chart. Included are the Corps Aviation Brigade (note 1) (with an Attack Helicopter Battalion), the Separate Brigade(s) (note 2), and the Armored Cavalry Regiment (note 3). Figure IX-2 shows the layout for both an Attack Helicopter Battalion and a Separate Armored Brigade. Figure IX-3 shows the layout for an Armored Cavalry Regiment.

Figure IX-4 displays a notional division layout, including the three brigades (note 1), the maneuver battalions (note 2), aviation elements (note 3) and cavalry (note 4). The aviation and cavalry elements have been reorganized in the division into the Air Cavalry Attack Brigade or ACAB (Figure IX-5), which has been renamed the Cavalry Brigade (Air Attack) or CB(AA).

The ACAB contains combat (Cavalry Squadrons and Attack Helicopter Battalions), combat support (the General Support Aviation Company and the Combat Support Aviation Company), and I/EW (the CEWI Aviation Company, or CEWIAC) functional elements.

The maneuver brigades are typically tasked organized from the maneuver battalions, and no standard chart applies. Figures IX-6 and IX-7 show the maneuver battalion layouts for each type found at the brigade echelon.

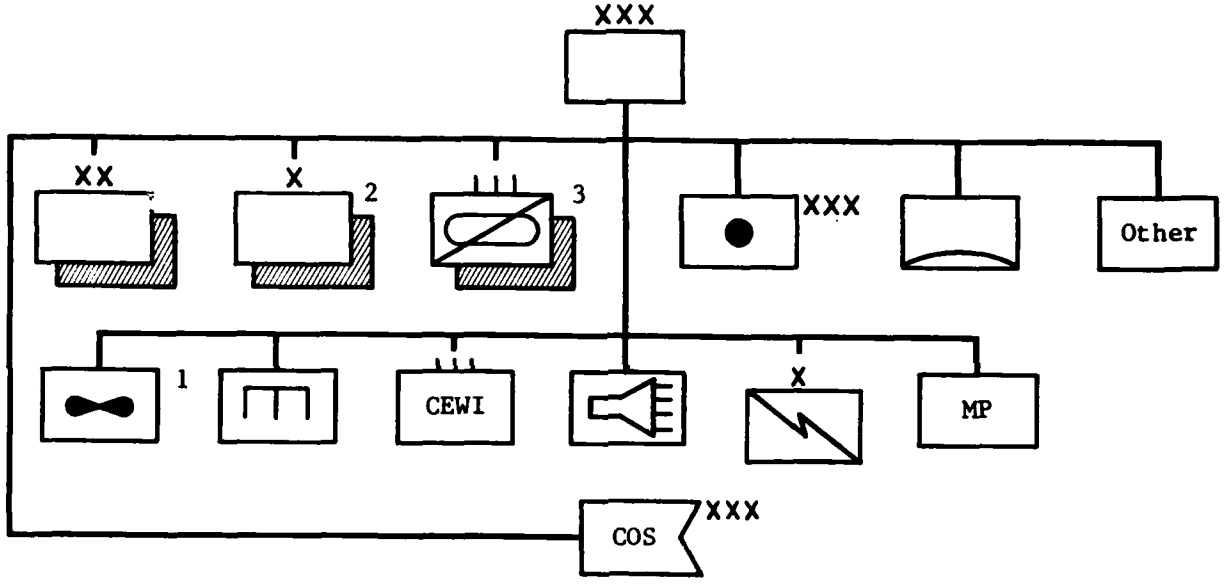
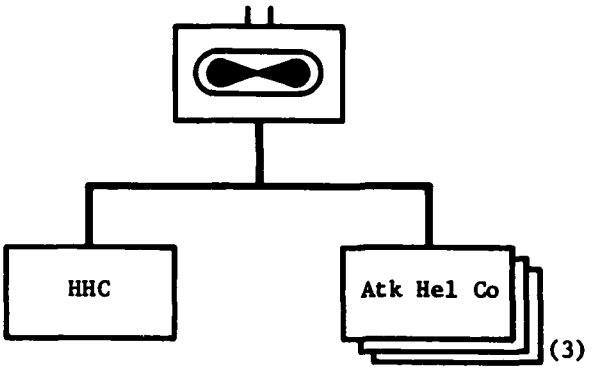


FIGURE IX-1
A NOTIONAL CORPS, COMBAT

ATTACK HELICOPTER BATTALION



SEPARATE ARMORED BRIGADE

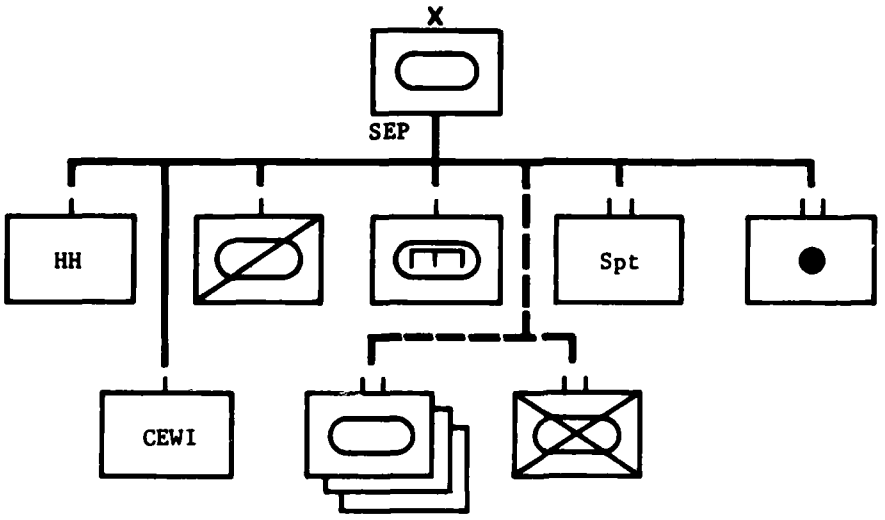
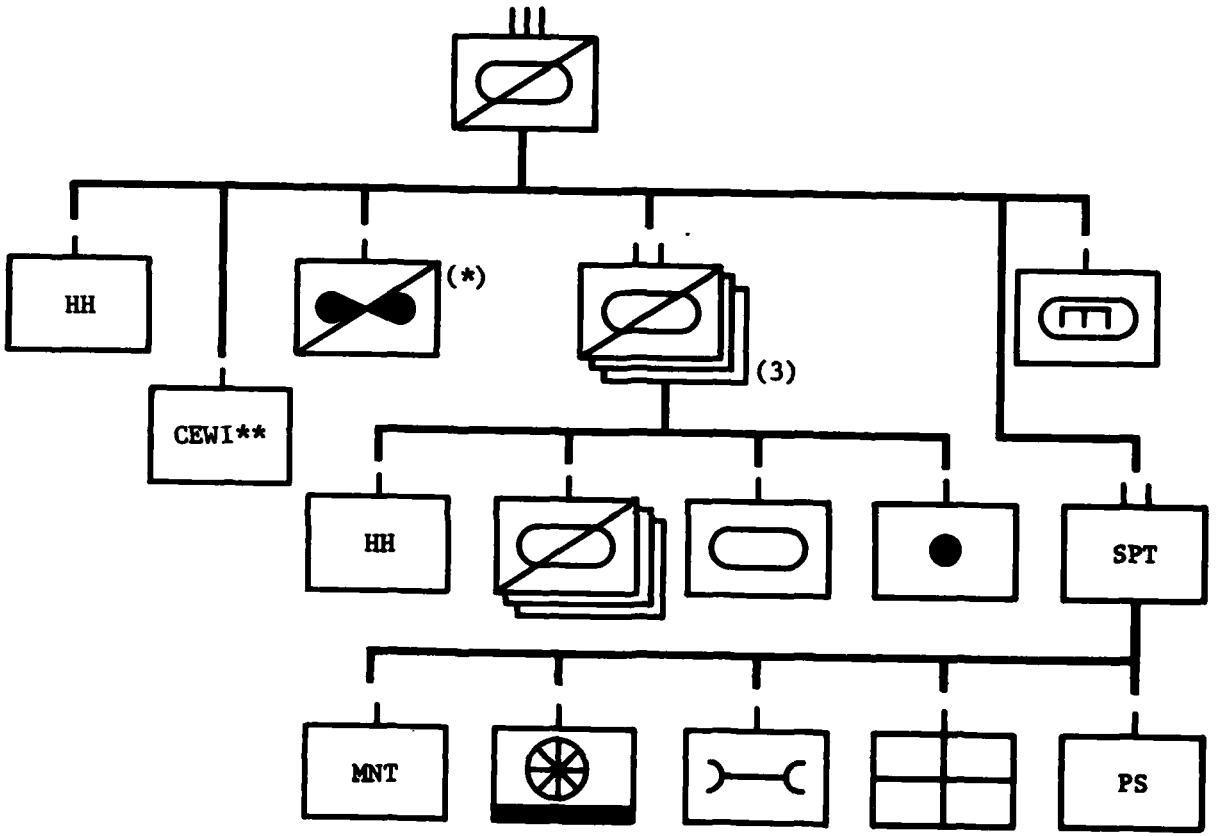


FIGURE IX-2
ATTACK HELICOPTER BATTALION AND SEPARATE BRIGADE



*Air cav trp in USAREUR is redesignated "cbt spt trp".
**Not included in current TOE.

FIGURE IX-3
ARMORED CAVALRY REGIMENT

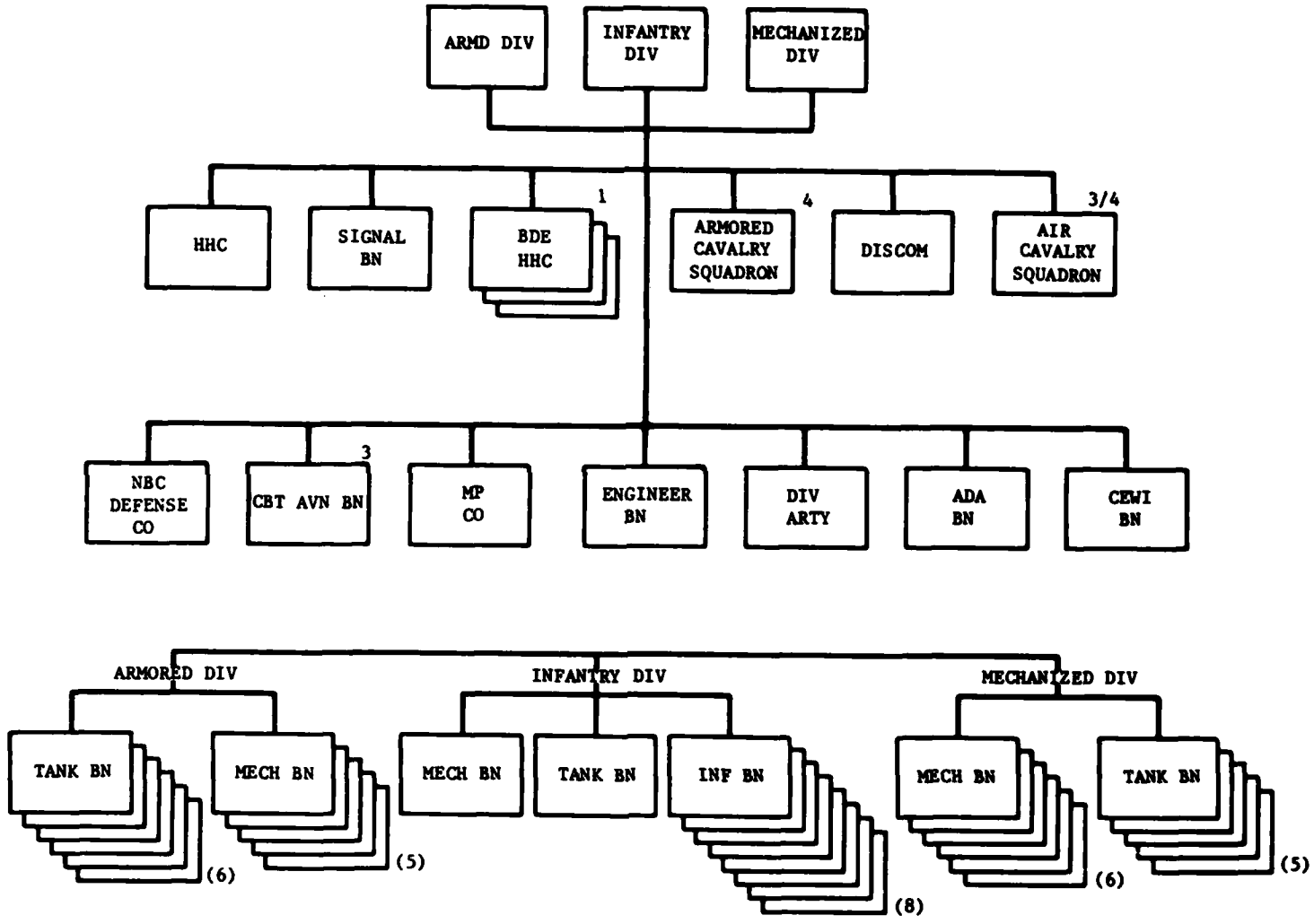
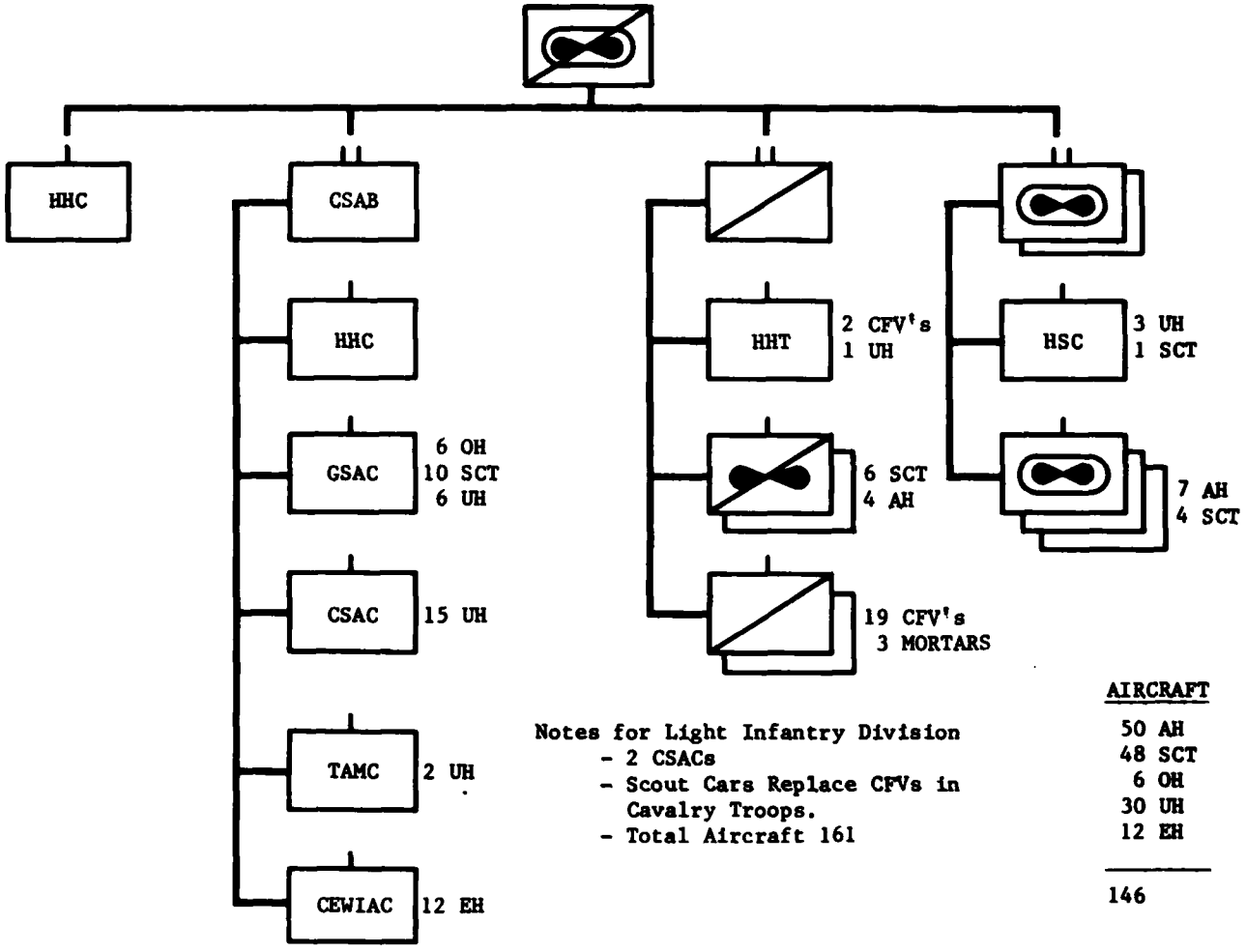


FIGURE IX-4
ARMORED, INFANTRY, AND MECHANIZED DIVISIONS

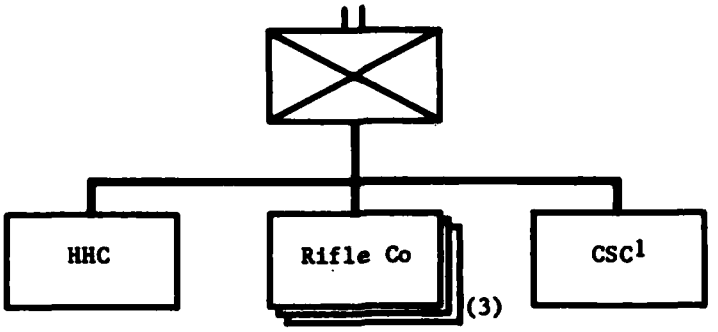


Notes for Light Infantry Division
- 2 CSACs
- Scout Cars Replace CFVs in Cavalry Troops.
- Total Aircraft 161

AIRCRAFT
50 AH
48 SCT
6 OH
30 UH
12 EH
146

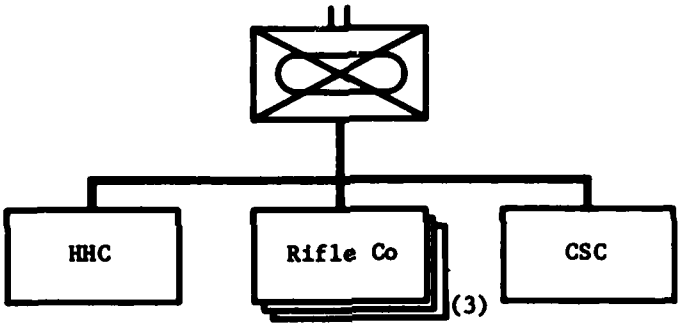
FIGURE IX-5
AIR CAVALRY ATTACK BRIGADE

INFANTRY BATTALION



[1]Combat support company

MECHANIZED BATTALION



TANK BATTALION

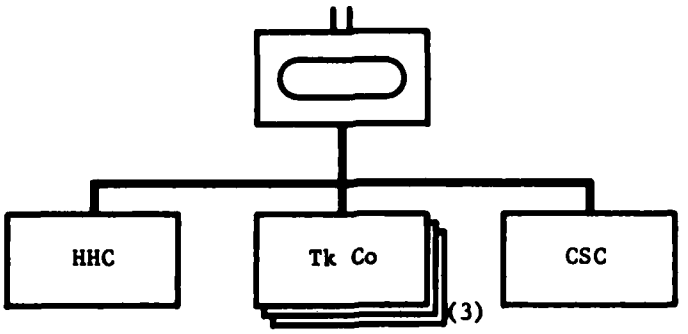
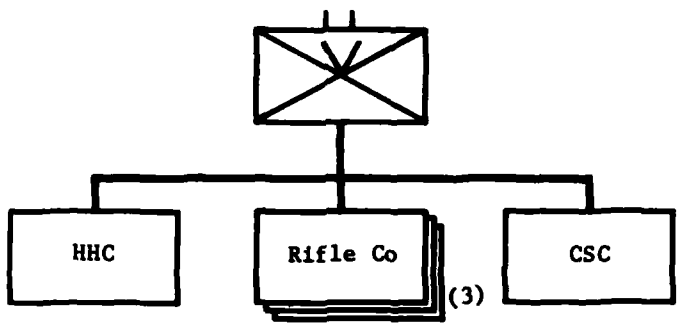
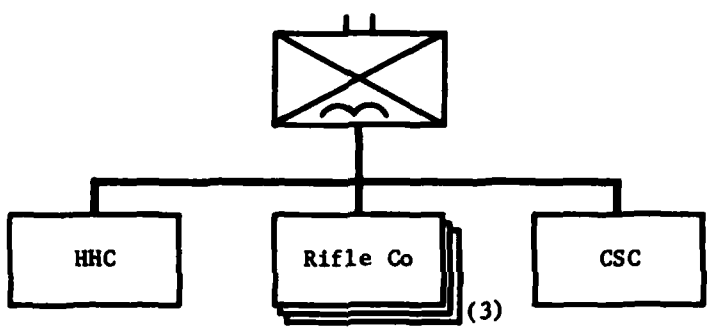


FIGURE IX-6
INFANTRY, MECHANIZED, AND TANK BATTALIONS

AIR ASSAULT BATTALION



AIRBORNE INFANTRY BATTALION



ATTACK HELICOPTER BATTALION

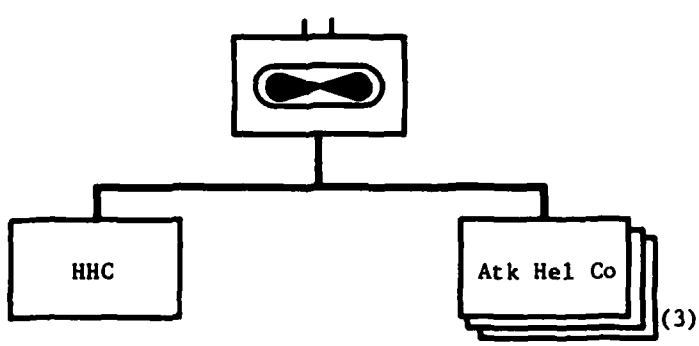


FIGURE IX-7
AIR ASSAULT, AIRBORNE INFANTRY, AND ATTACK HELICOPTER BATTALION

Maneuver Control, Combat Support

Figure IX-8 again shows a notional corps layout. The combat support elements are shown with the Aviation Brigade (note 1), the Engineer Brigade (note 2), the Signal Brigade and MP unit (note 3). Signal and MP units are omitted in this paper, as noted above.

Figure IX-9 depicts the organizational diagrams for the ADM Company and NBC Defense Company at corps echelon. Figure IX-10 shows the Engineer Water Supply Company, the Engineer Combat Battalion (Heavy) and one of the Non-Tactical Bridge Companies. Figures IX-11 and IX-12 continue the Non-Tactical Bridge Company layouts and Figure IX-13 depicts the two combat support aviation units at corps, the Assault Helicopter Battalion and the Assault Support Helicopter Battalion, both under the Corps Aviation Brigade.

Figure IX-14 details a notional division layout. Of note here for combat support is the Engineer Battalion (note 1), the Aviation Battalion (note 2) which has now been included in an aviation brigade (the ACAB), the NBC Defense Company (note 3), and the Signal Battalion (note 4). Again signal units have been omitted in this paper. Figure IX-14 also shows the divisional Engineer Battalion layout.

Figure IX-15 shows the ACAB organization, with the CSAC, or Combat Support Aviation Company. All other divisional combat support units shown in Figure III-2 are direct support from corps, and can be found in those figures dealing with the corps echelon. In the same way, the CSAC and Engineer Combat Company at brigade can be found in the diagrams for the division.

The General Support Company (GSAC) provides helicopters to DIVARTY and the division commander and his staff. It is not considered significant to model explicitly as a combat support unit.

I/EW

Figures IX-16 and IX-17 show the current doctrinal view of the CEWI organizations at corps and division levels, including both operations and intelligence staffs. These units are currently responsible for jamming mission management, SIGINT collection, jamming, and single-source analyses. Overall collection management and multi-source fusion direction is currently the role of the G^2 staff at corps and division echelons.

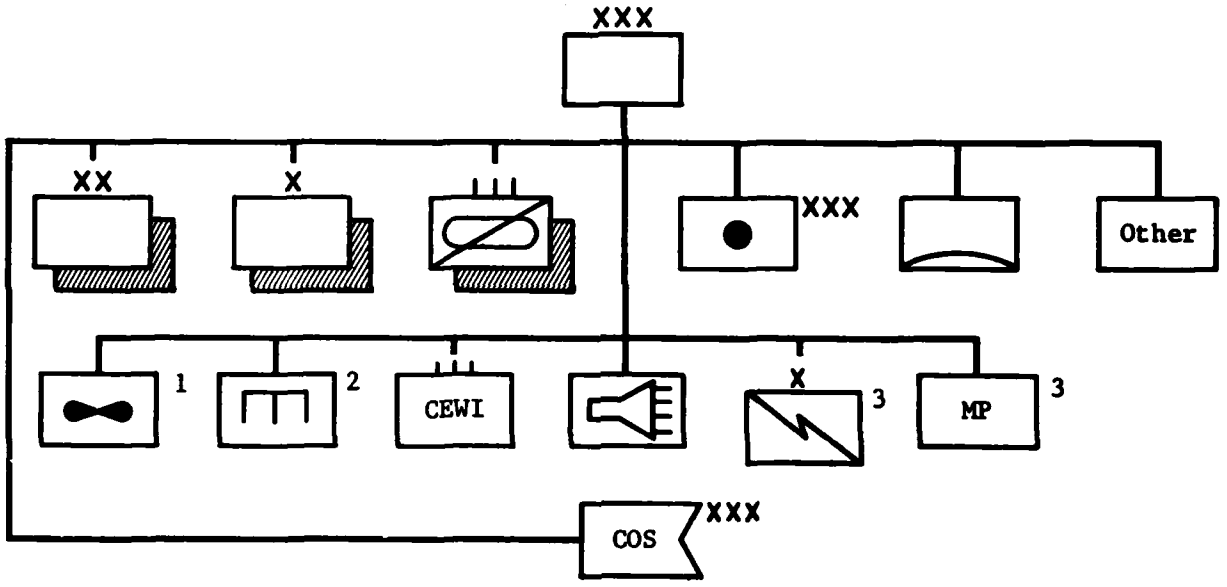
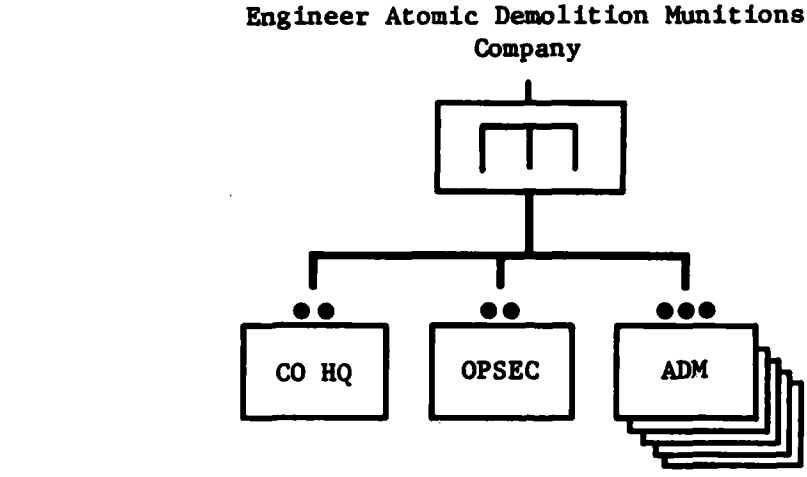


FIGURE IX-8
A NOTIONAL CORPS, COMBAT SUPPORT



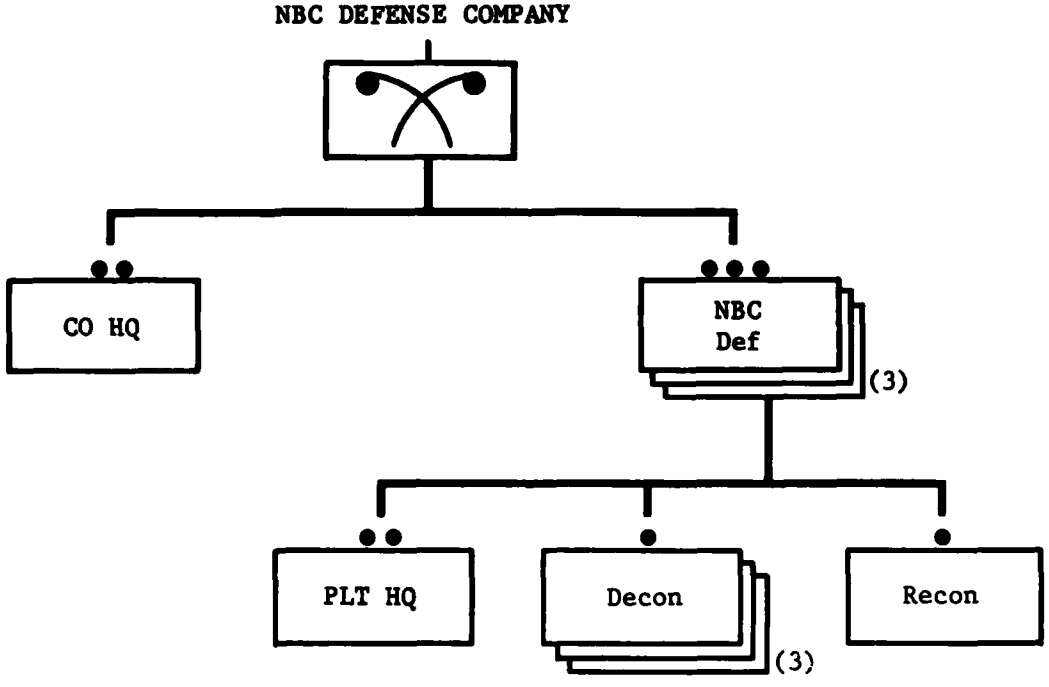
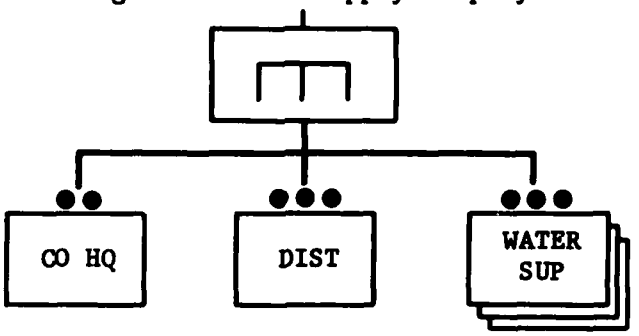
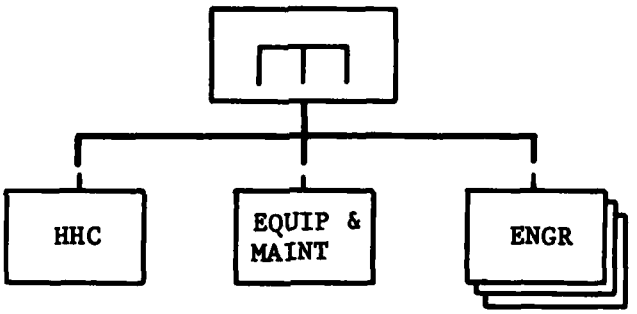


FIGURE IX-9
ENGINEER ATOMIC DEMOLITION MUNITIONS COMPANY AND NBC DEFENSE COMPANY

Engineer Water Supply Company



Engineer Combat Battalion, Heavy



Engineer Medium Girder Bridge Company

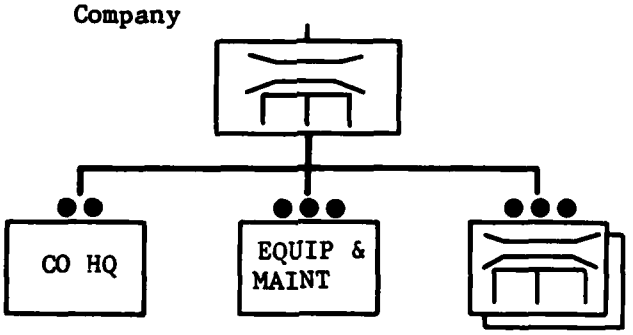


FIGURE IX-10
ENGINEER WATER SUPPLY COMPANY; ENGINEER COMBAT BATTALION, HEAVY; AND ENGINEER MEDIUM GIRDER BRIDGE COMPANY

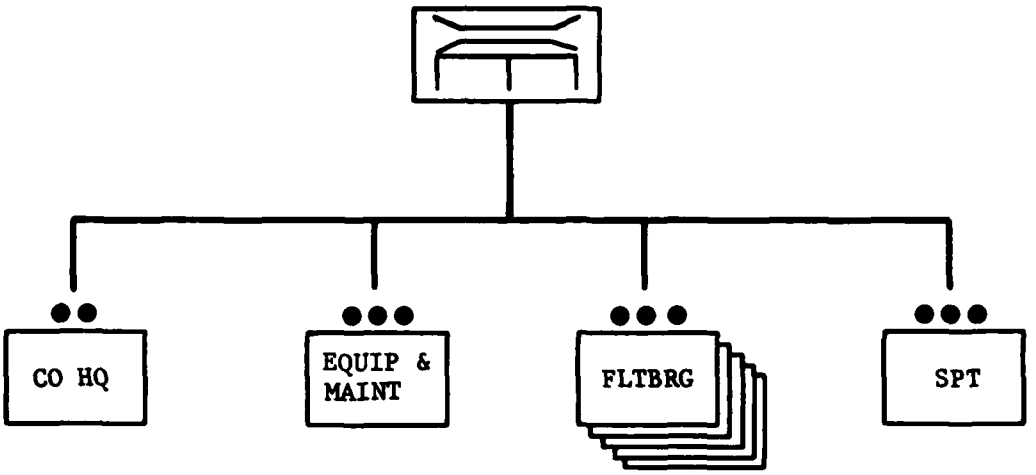
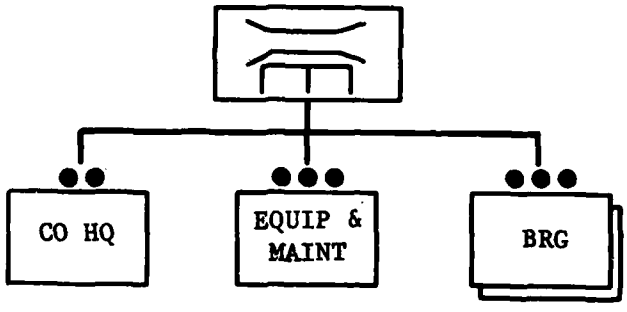
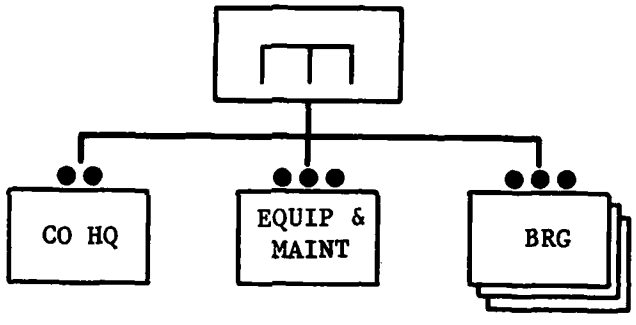


FIGURE IX-11
ENGINEER FLOAT BRIDGE COMPANY

Engineer Panel Bridge Company



Engineer Assault Bridge Company Mobile



Engineer Assault Float Bridge Company, Ribbon

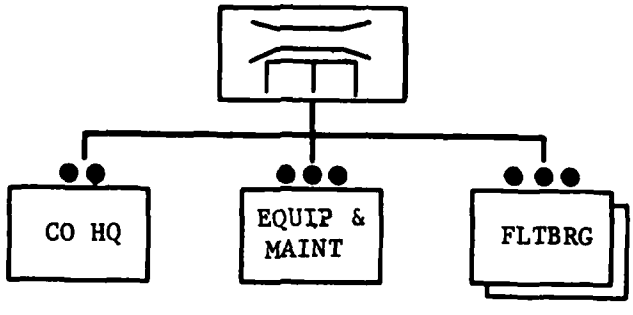


FIGURE IX-12
ENGINEER PANEL BRIDGE, ASSAULT BRIDGE, AND FLOAT BRIDGE COMPANIES

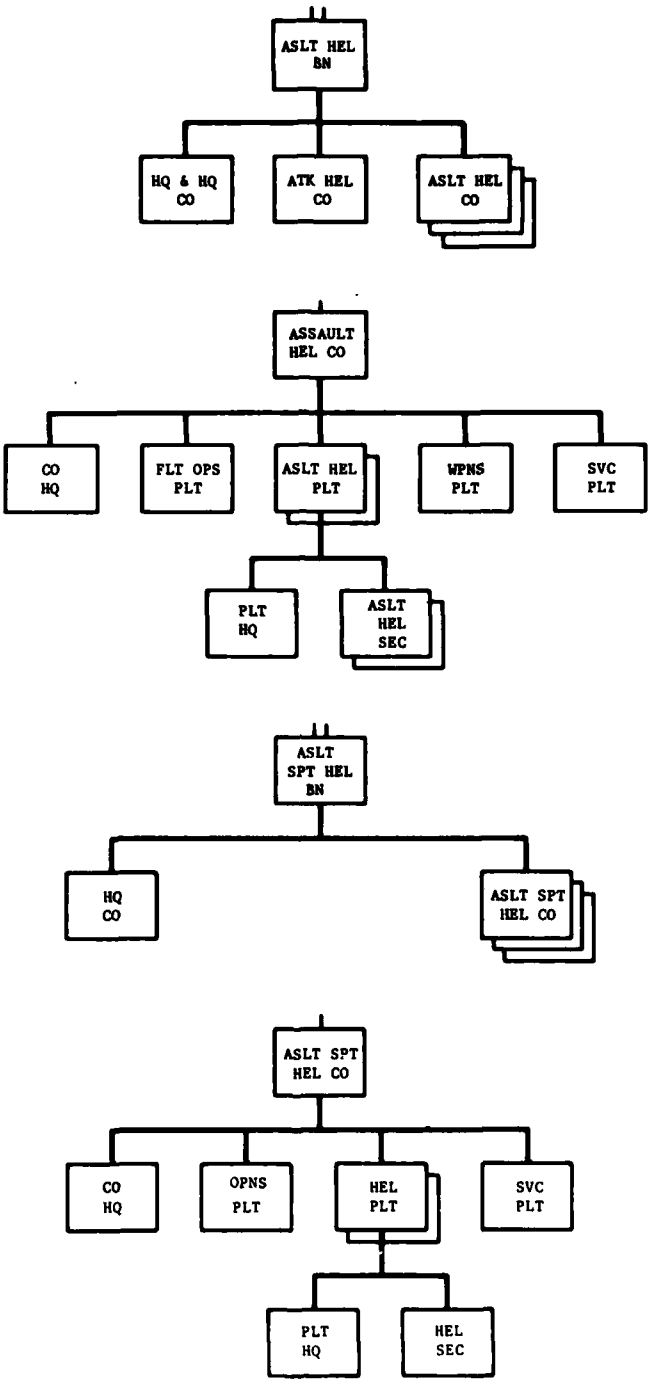
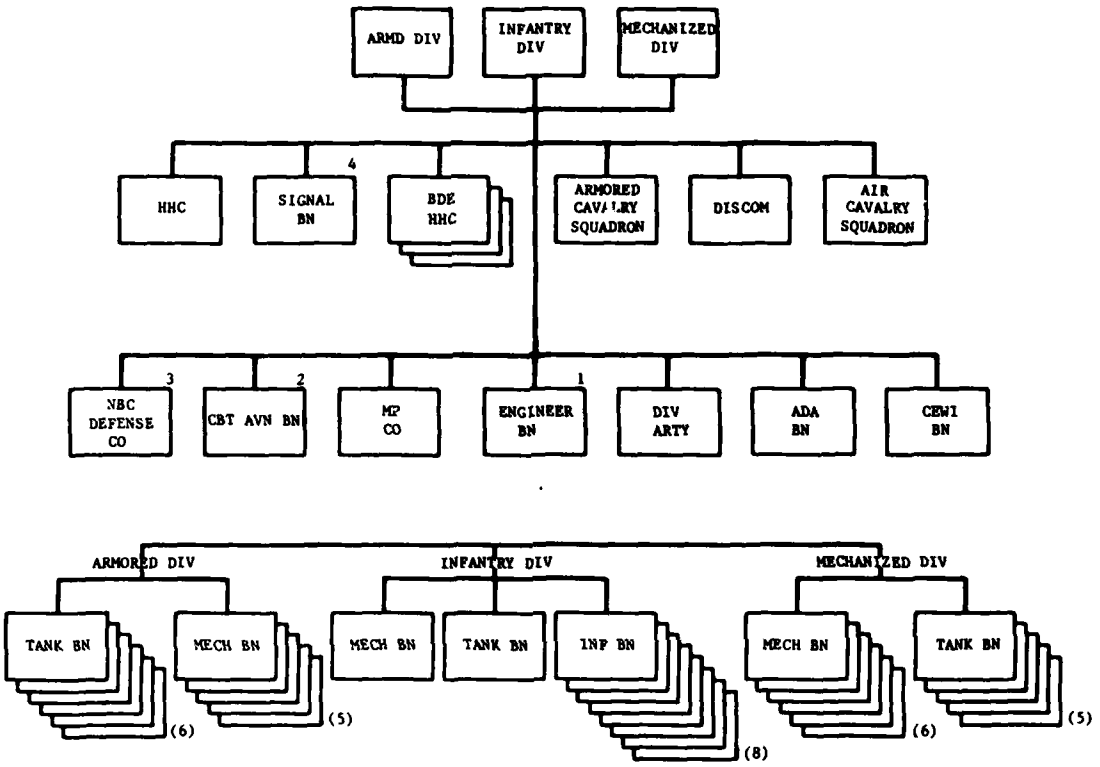


FIGURE IX-13
ASSAULT HELICOPTER AND ASSAULT SUPPORT HELICOPTER BATTALIONS

ARMORED, INFANTRY, AND MECHANIZED DIVISIONS



Engineer Battalion, Armored Division
or Infantry Div (Mechanized)

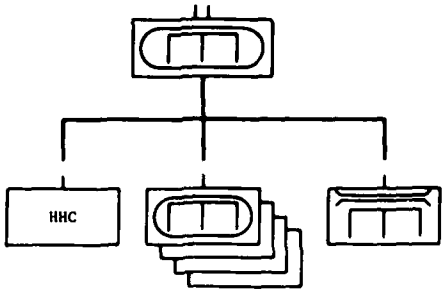
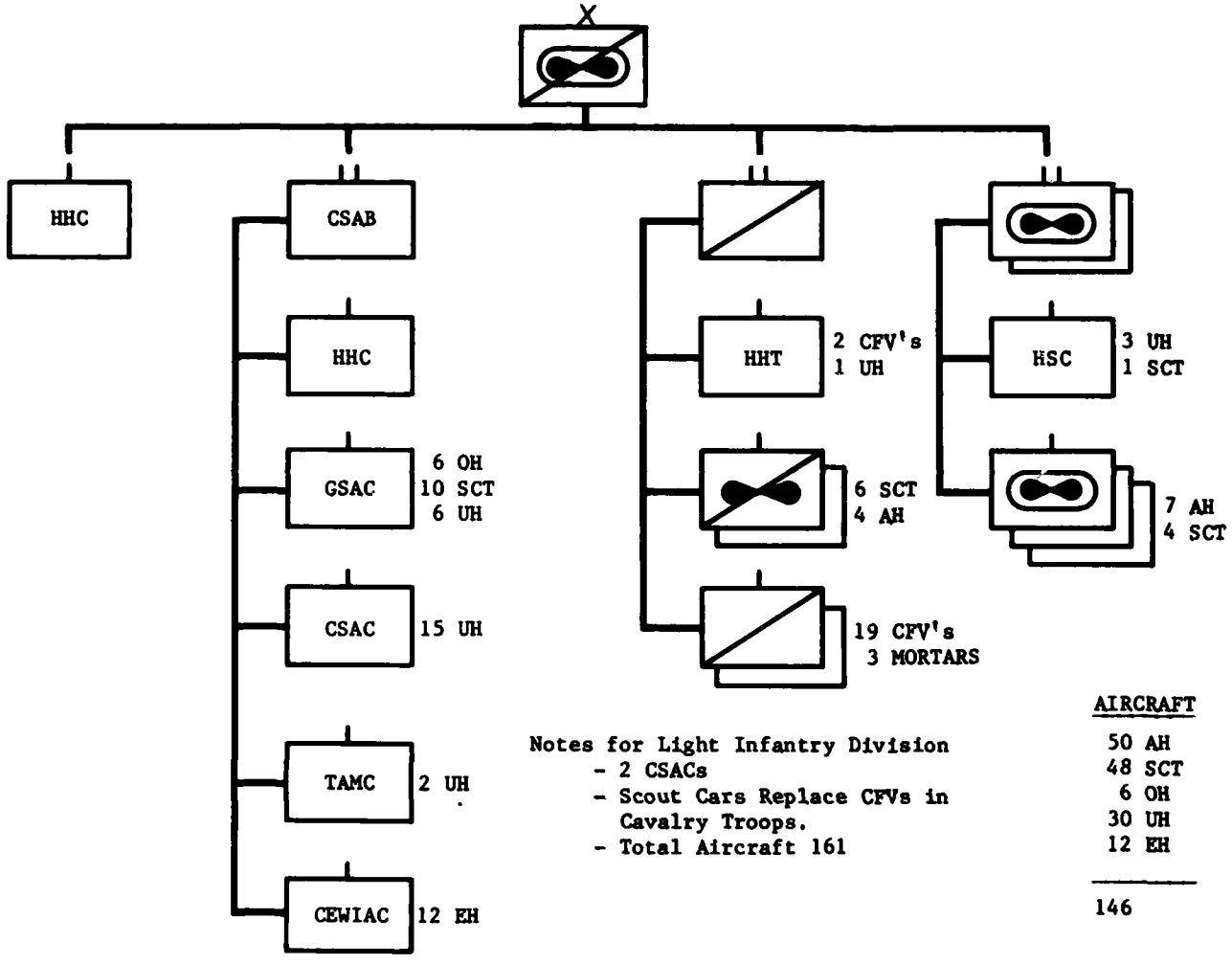


FIGURE IX-14
NOTIONAL DIVISION LAYOUT, COMBAT SUPPORT



Notes for Light Infantry Division
- 2 CSACs
- Scout Cars Replace CFVs in Cavalry Troops.
- Total Aircraft 161

AIRCRAFT	
50	AH
48	SCT
6	OH
30	UH
12	EH
146	

FIGURE IX-15
ACAB ORGANIZATION

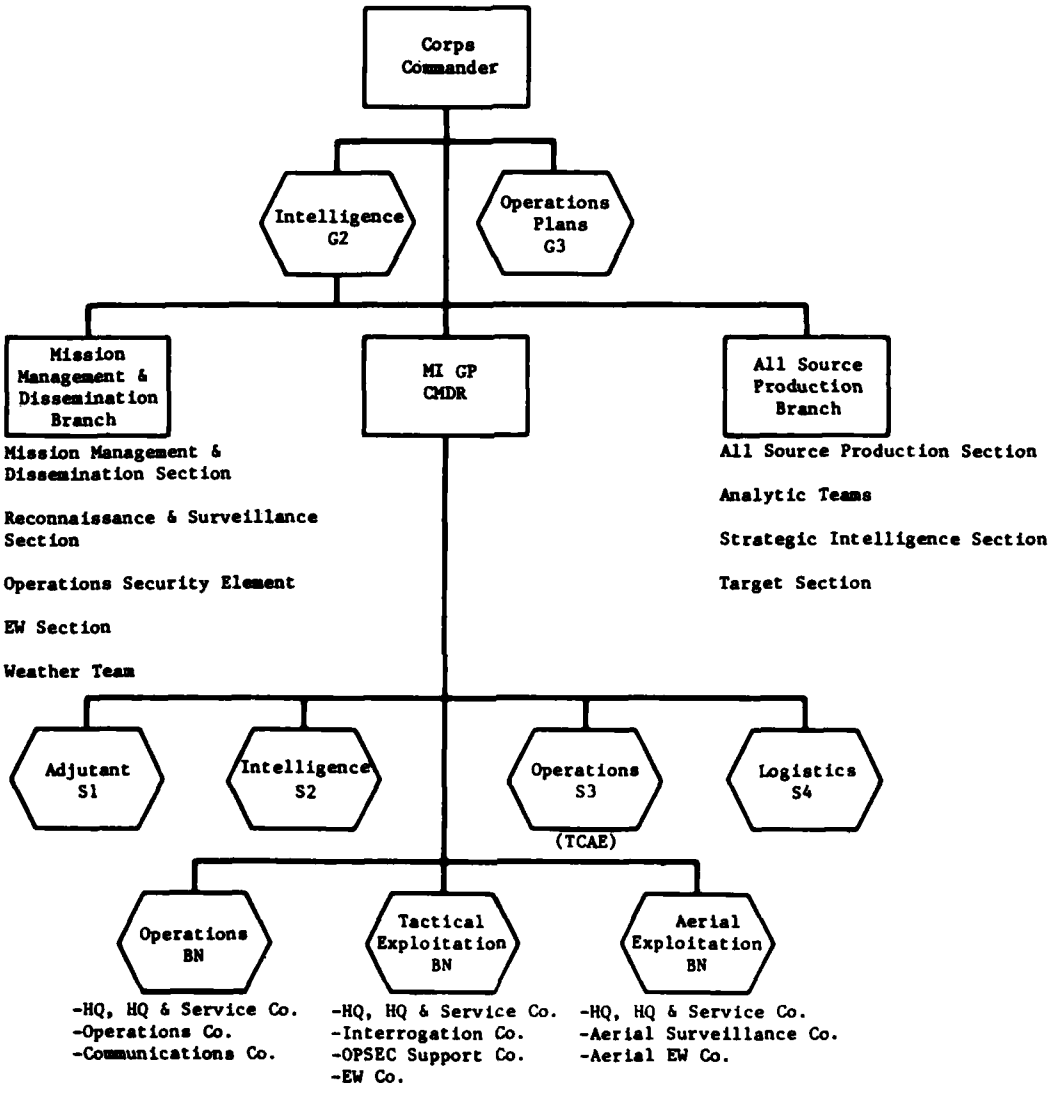


FIGURE IX-16
THE CORPS IEW ARCHITECTURE

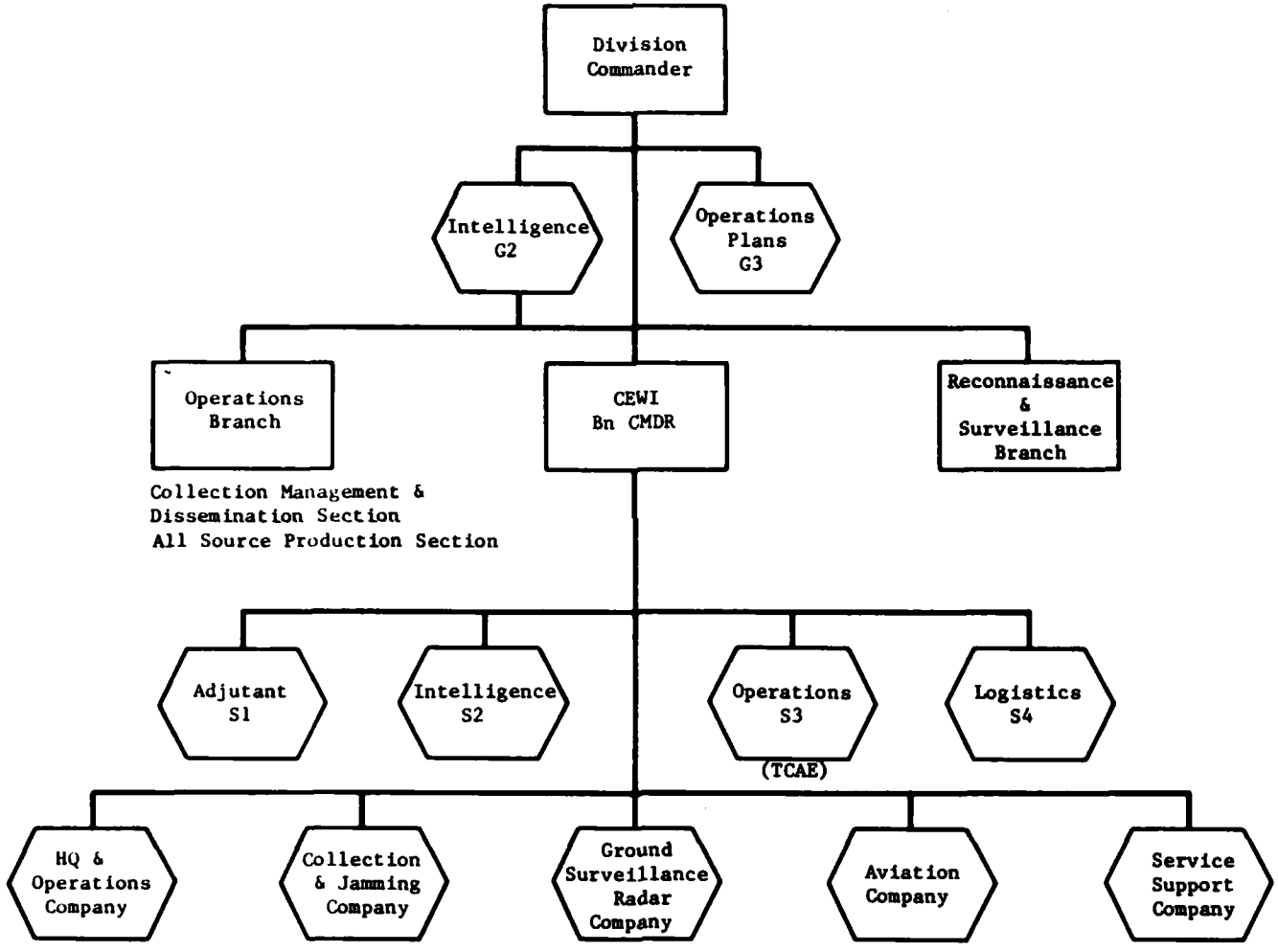


FIGURE IX-17
THE DIVISION IEW ARCHITECTURE

Fire Support

Figure IX-18 shows the organization of the field artillery.

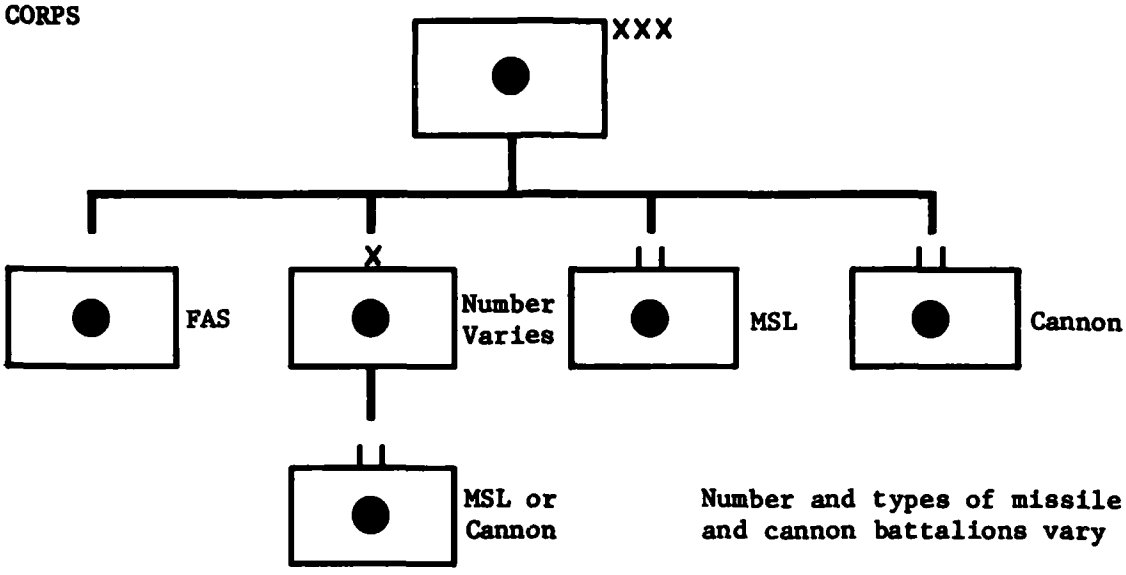
Air Defense

Figure IX-19 represents the organization of HIMAD air defense units; Figure IX-20 that of SHORAD units.

Combat Service Support

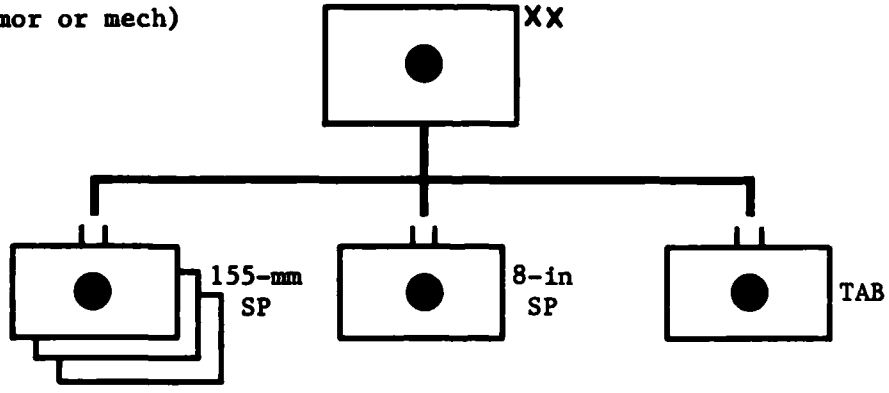
Figures IX-21 and IX-22 show the organization of the COSCOM and the DISCOM, respectively.

CORPS



Brigade and separate battalions may be assigned missions in support of divisions or maintained under corps control.

DIVISION
(armor or mech)



Normally the 8-in SP BN is maintained under divarty control and given a general support mission, the 155-mm SP BN's are direct support to forward brigades while the TAB assets are divided between DS and GS.

FIGURE IX-18
FIELD ARTILLERY ORGANIZATION DIAGRAM

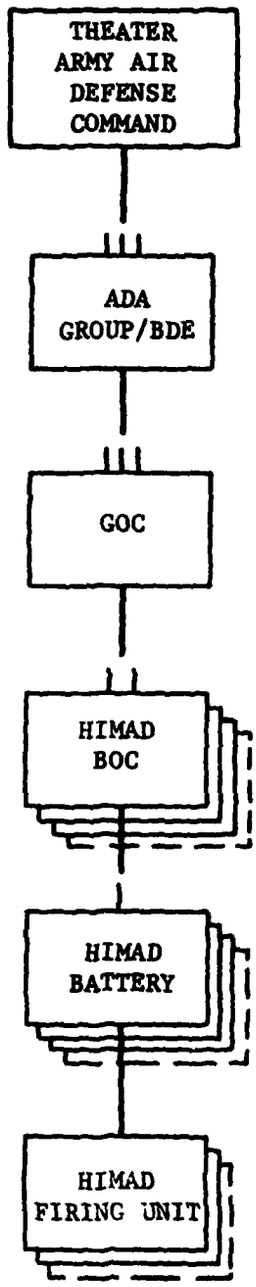


FIGURE IX-19
AIR DEFENSE ORGANIZATION (HIMAD)

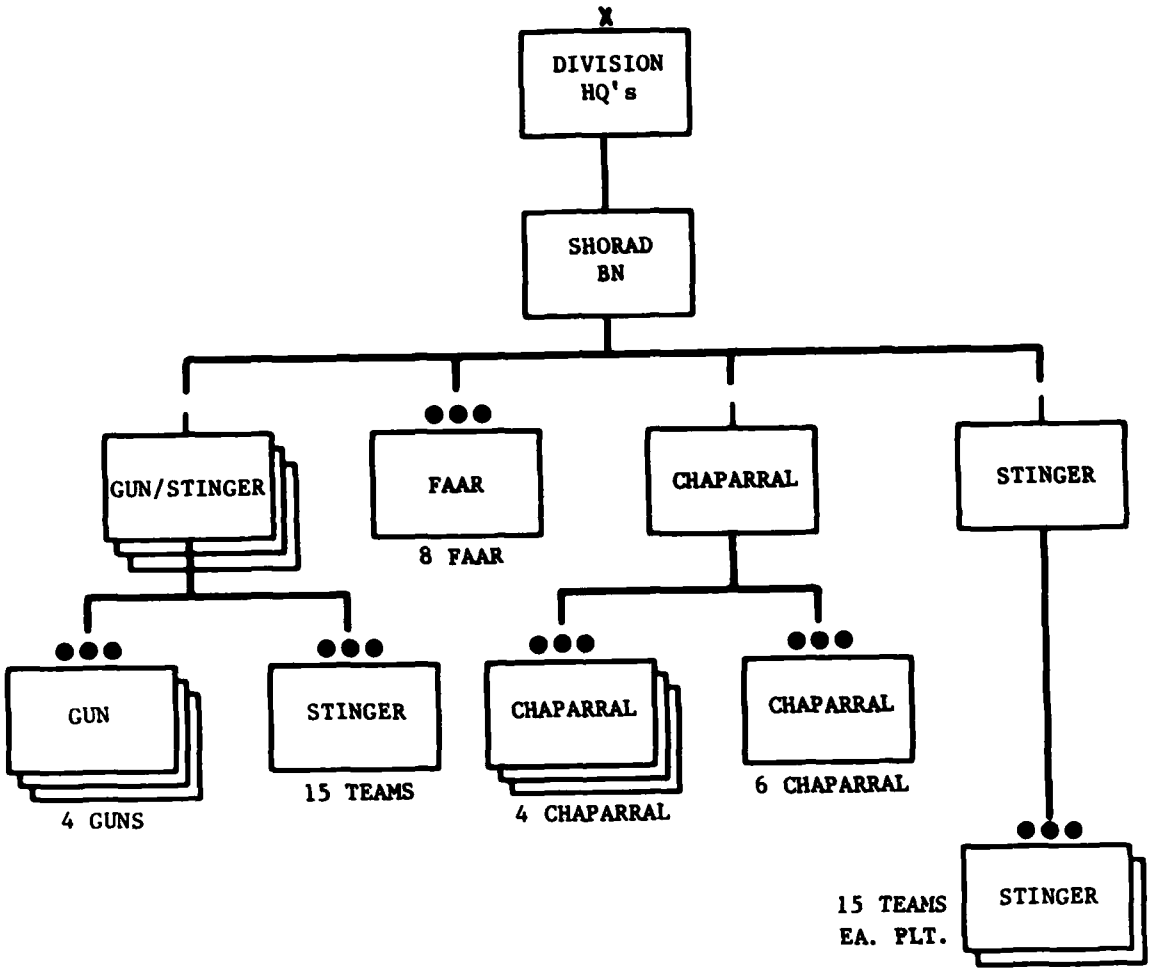
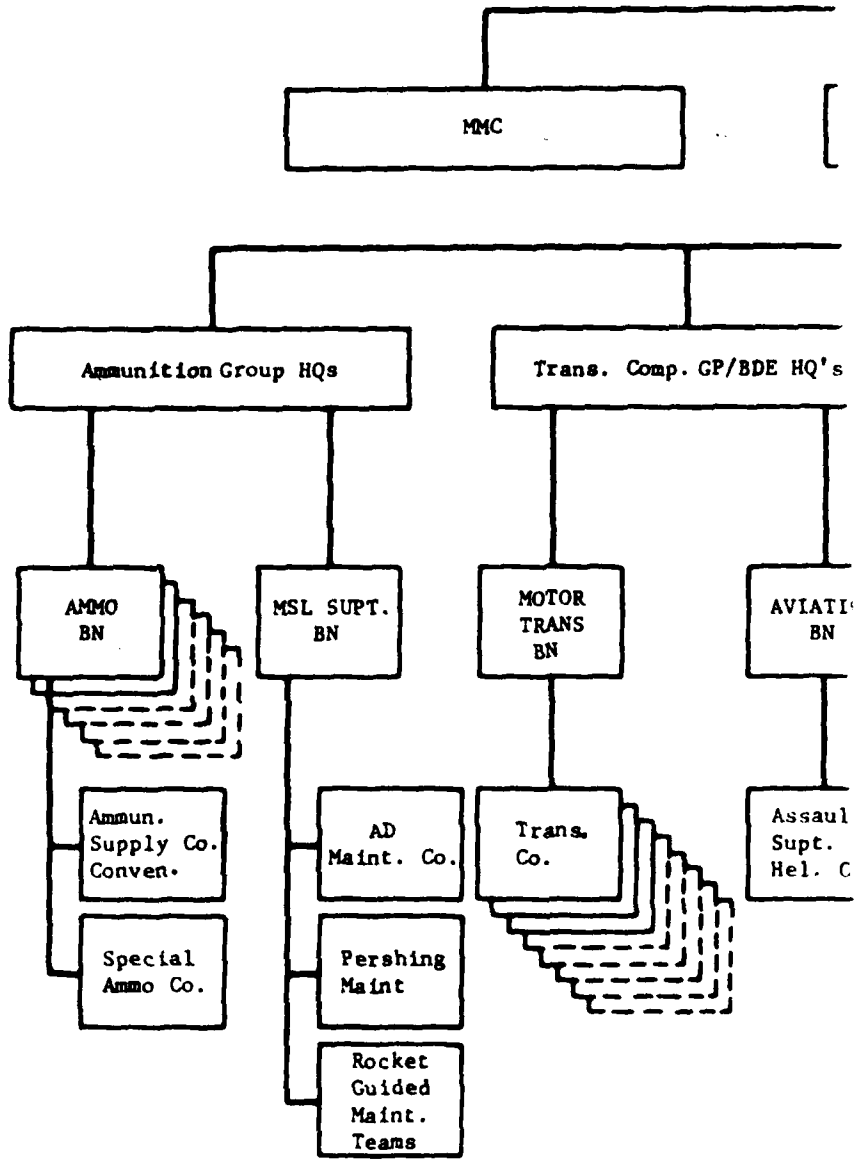
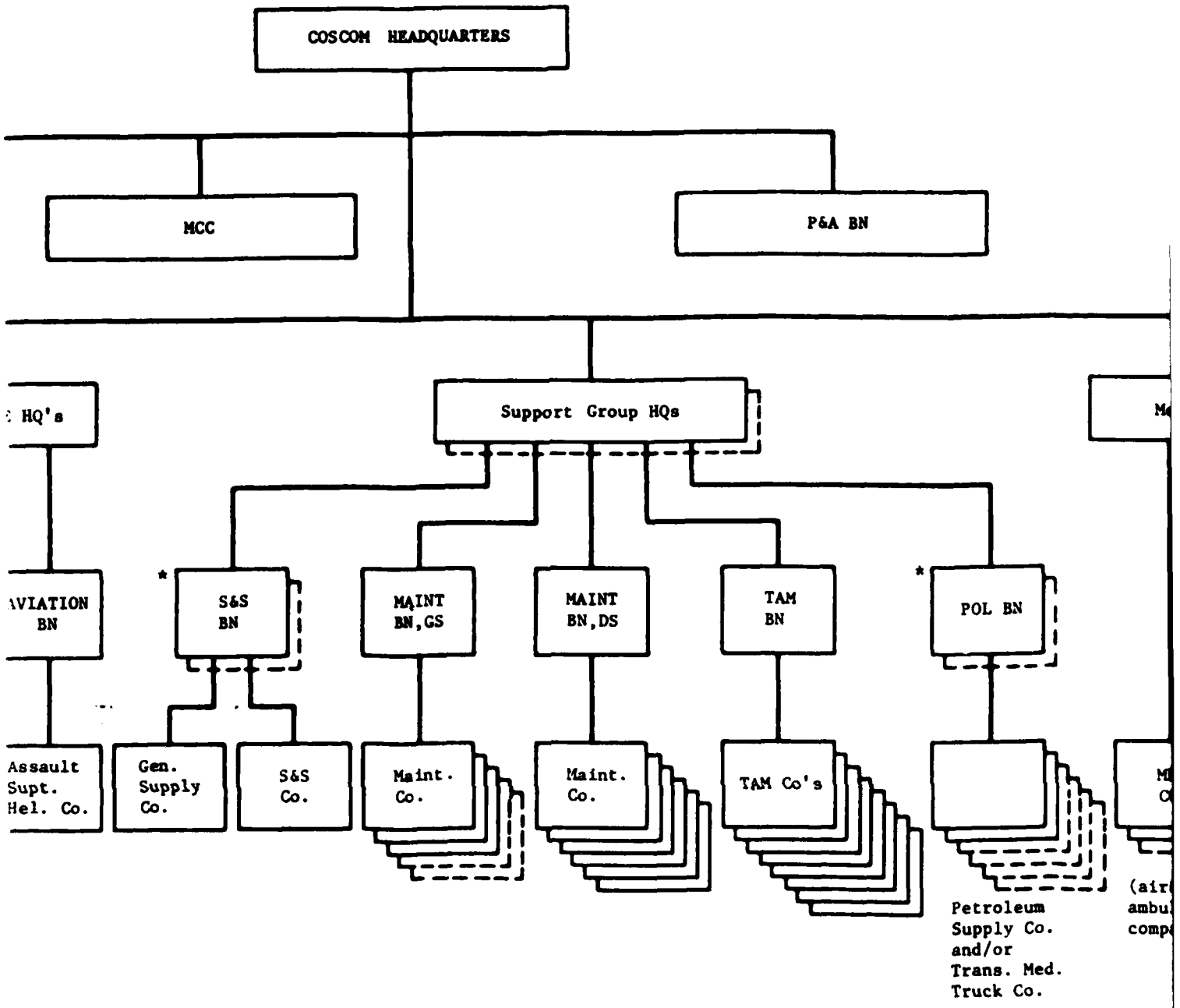


FIGURE IX-20
AIR DEFENSE ORGANIZATION (SHORAD)



*There are 5-7 S&S or POL BN's, or a combination of the 2 types.


COSCOM HEADQUARTERS
MCC
P&A BN
HQ's
Support Group HQs
AVIATION BN
S&S BN
MAINT BN,GS
MAINT BN,DS
TAM BN
POL BN
Assault Supt. Hel. Co.
Gen. Supply Co.
S&S Co.
Maint. Co.
Maint. Co.
TAM Co's
Petroleum Supply Co. and/or Trans. Med. Truck Co.

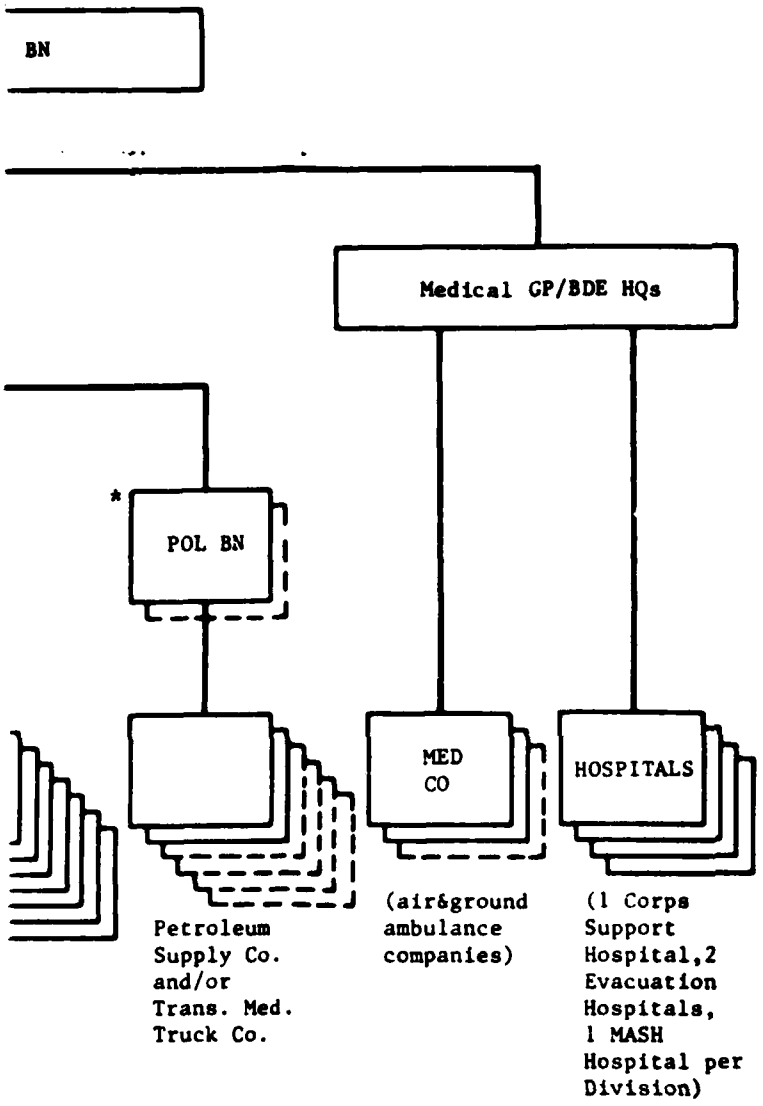


FIGURE IX-21
COSCOM ORGANIZATION

3

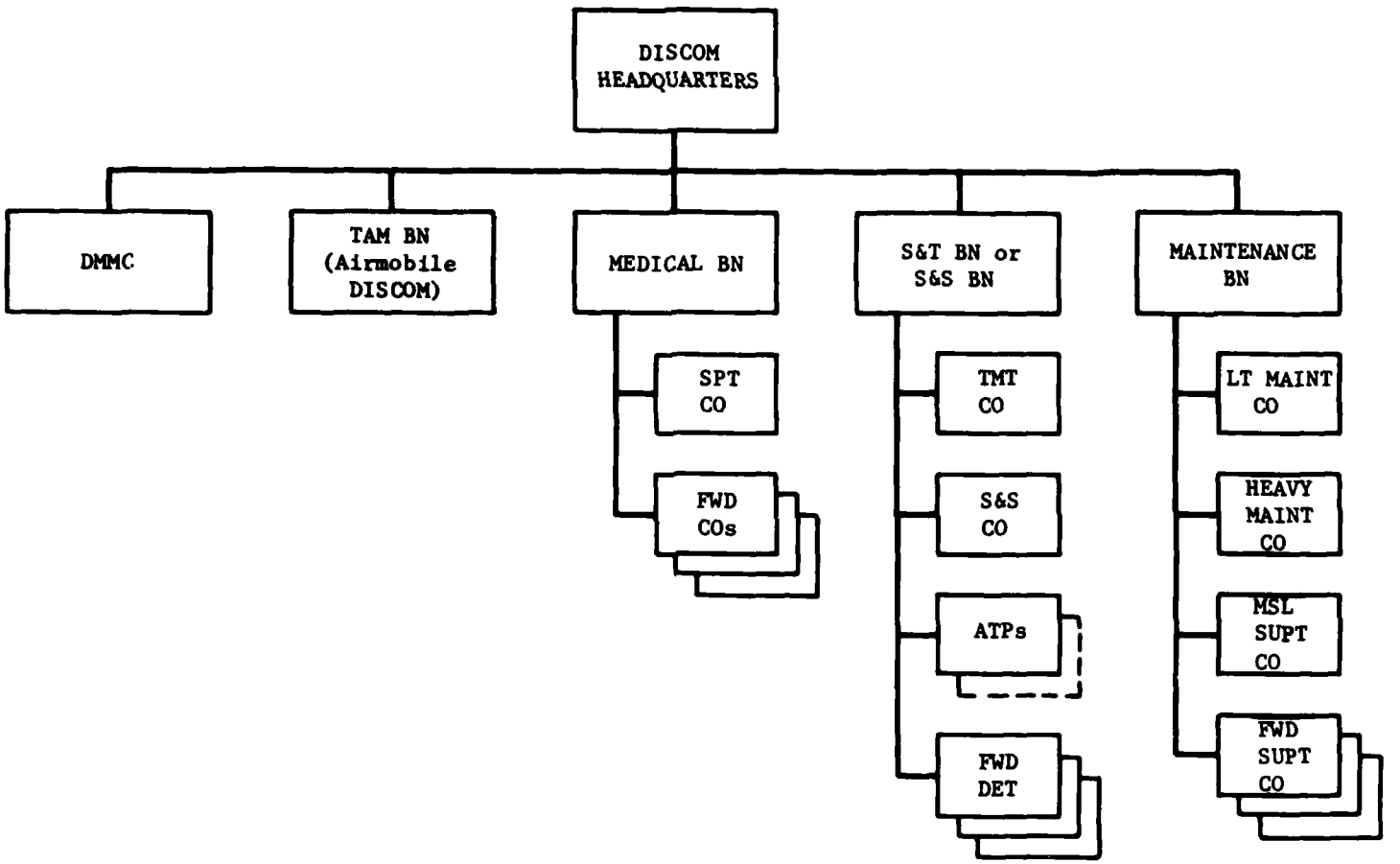


FIGURE IX-22
DISCOM ORGANIZATION

GLOSSARY

AASLT	Air Assault
ABN	Airborne
ACAB	Air Cavalry Attack Brigade
ACC	Airspace Coordination Center
ACFT	Aircraft
ACR	Armored Cavalry Regiment
ADA	Air Defense Artillery
ADM	Atomic Demolition Munitions
ADP	Automatic Data Processing
ADPC	Automatic Data Processing Center
AF	Air Force
AHB	Assault Helicopter Battalion
AI	Artificial Intelligence
AI	Area of Interest
AIM	Armored, Infantry, Mechanized Infantry
AMBL	Airmobile
AMIP	Army Model Improvement Program
AMMO	Army Model Management Office
APC	Armored Personnel Carrier
ASHB	Assault Support Helicopter Battalion
ASL	Authorized Stockage List
ASOC	Air Space Operations Center
ASP	Ammunition Supply Point
ATGM	Anti-Tank Guided Munition
AVIM	Aviation Intermediate Maintenance
AVLB	Armored Vehicle Launched Bridge
AVN	Aviation
BAI	Battlefield Air Interdiction
BN	Battalion
BOC	Battalion Operations Center
BTRY	Battery
C&J CO	Collection and Jamming Company
C&J PLT	Collection and Jamming Platoon
CAS	Close Air Support
CASAA	Combined Arms Studies and Analysis Activity

GLOSSARY

(Continued)

CASTFOREM	Combined Arms and Support Task Force Evaluation Model
CEWI BN	Communications Electronic Warfare Intelligence Battalion
CEWI GP	Communications Electronic Warfare Intelligence Group
CMDS	Collection Management and Dissemination Section
COMINT	Communications Intelligence
COMMZ	Communication Zone
CONUS	Continental United States
CORDIVEM	Corps/Division Evaluation Model
COSCOM	Corps Support Command
CRC	Control and Reporting Center
CSA	Corps Storage Area
CSAC	Combat Support Aviation Company
CSR	Controlled Supply Rate
CSS	Combat Service Support
CTOC	Corps Tactical Operations Center (in the main command post)
DDC	Division Data Center
DEFCON	Defense Readiness Condition
DF	Direction Finding
DISCOM	Division Support Command
DIVAD	Division Air Defense
DIVARTY	Division Artillery
DLOGS	Division Logistics System
DMMC	Division Materiel Management Center
DS	Direct Support
DSS	Direct Support System
DTOC	Division Tactical Operations Center
EAC	Echelons Above Corps
ECM	Electronic Counter Measures
EEI	Essential Elements of Information
ELINT	Electronic Intelligence

GLOSSARY

(Continued)

EMP	Electromagnetic Pulse
EW	Electronic Warfare
FA	Field Artillery
FAAR	Forward Area Alerting Radar
FAC	Forward Air Controller
FARP	Forward Arming and Refueling Point
FAS	Field Artillery Section (Corps)
FASCO	Forward Area Support Coordinating Officer
FDC	Fire Detection Center
FIST	Fire Support Team
FORCEM	Force Evaluation Model
FRAGORD	Fragmentary Order
FSE	Fire Support Element
FSL	Field Storage Location
G2	Intelligence Officer/Section
G2/S2	Intelligence Staff
G3	Operations Officer/Section
G3/S3	Operations Staff
GOC	Group Operations Center
GP	Group
GS	General Support
GS RADAR CO	Ground Surveillance Radar Company
GSR	General Support Reinforcing
GUARDRAIL	Airborne COMINT and DF system
HF	High Frequency
HIMAD	High to Medium Air Defense
HPI	High-Powered Illumination
ICC	Information Coordination Center
ICWAR	Improved Continuous Wave Acquisition Radar
I/EW	Intelligence/Electronic Warfare
IMINT	Imagery Intelligence

GLOSSARY

(Continued)

MASH	Mobile Army Surgical Hospital
MCC	Movement Control Center
MCRS	Multiple Launcher Rocket System
MECH	Mechanized Infantry
MEDCOM	Medical Command
MMC	Materiel Management Center
MMDS	Mission Management and Dissemination Section
MOC	Military Occupational Specialty
MOHAWK	OV-1D fixed wing aircraft which carries SLAR, photo, imagery systems
MOPP	Mission Oriented Protective Posture
MOS	Military Occupational Specialty
MP	Military Police
MRM	Maintenance Reporting and Management System
MSL	Missile
MTI	Moving Target Indicator
NBC	Nuclear, Biological and Chemical
NGF	Naval Gunfire
NGF TM	Naval Gunfire Team
NGFO	Naval Gunfire Officer
NICP	National Inventory Control Point
O/I	Operations and Intelligence Element
OIR	Other Intelligence Requirements
OPLAN	Operations Plan
OPORD	Operations Order
OPS	Operations
PAR	Pulse Acquisition Radar
PLL	Prescribed Load List
POL	Petroleum, Oil and Lubricants
PTL	Primary Target Lines

GLOSSARY

(Concluded)

QUICKFIX	Airborne Integrated SIGINT and Jamming System (helicopter)
QUICKLOOK	Airborne ELINT system (fixed wing)
R/S	Reconnaissance/Surveillance
RACO	Rear Area Combat Operations
RATT	Radio Teletype
RECCE	Reconnaissance
REMS	Remote Sensors
ROR	Range-Only Radar
S/F	Sound and Flash
S2	Intelligence Officer
SASP	Special Ammunition Supply Point
SHORAD	Short Range Air Defense
SIGINT	Enemy Signals Intelligence (including Communications Intelligence - COMINT, and Electronic Intelligence - ELINT)
SLAR	Side Looking Airborne Radar
SP	Self-propelled
STANAG	Standardization Agreement
TAB	Target Acquisition Battery
TAC CP	Tactical Command Post
TACFIRE	Tactical Fire Direction System
TACP	Tactical Air Control Party
TCAE	Technical Control Analysis Element
TOC	Tactical Operations Center
TRADOC	Training and Doctrine Command
TRAILBLAZER	Ground based COMINT and DF system
TRASANA	TRADOC Studies and Analysis Activity
TREE	Transient Radiation Effects on Electronics
TUOC	Tactical Unit Operations Center
XX	Symbol for Division
XXX	Symbol for Corps

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